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CONTENTS

	Page
Original Papers	
Lipemia retinalis. James H. Allen and William A. Howard	645
An analysis of recent studies on the etiology of trachoma. Phillips Thygeson	649
The screen test and its application. James Watson White	653
Superior-rectus fascia-lata sling in the correction of ptosis. C. Allen Dickey	660
The treatment of trachoma. A. F. Lenzen and H. S. Gradle	665
Severe tuberculosis of the anterior segment of the eye. E. V. L. Brown	668
Scientific bases for selection of bifocal lenses. Albert L. Anderson	675
The concentration of lysozyme in the tears in acute and chronic conjunctivitis. Richard Thompson and Eduardo Gallardo	684
Aniseikonia. Wendell L. Hughes	686
Notes, Cases, Instruments	
The recession operation. P. Chalmers Jameson	689
A simple technique for plotting diplopia. William D. Rowland	698
Surgical-diathermy extirpation of the lacrimal sac. H. Rommel Hildreth	699
Eye physicians selling light. Louis Lehrfeld	700
Some results of orthoptic training in adults. Martha Lyon	702
Society Proceedings	
Los Angeles, New England, Minnesota, Philadelphia	703
Editorials	
Throw away your glasses; Free-circulation medical abstract journals	710
Book Notices	714
Obituaries	714
Correspondence	715
Abstract Department	717
News Items	738

For complete table of contents see advertising page V

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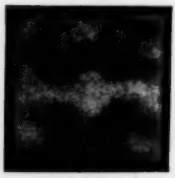

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FIG. 1 (ALLEN AND HOWARD). FUNDUS O.S.—72 HOURS AFTER ADMISSION.

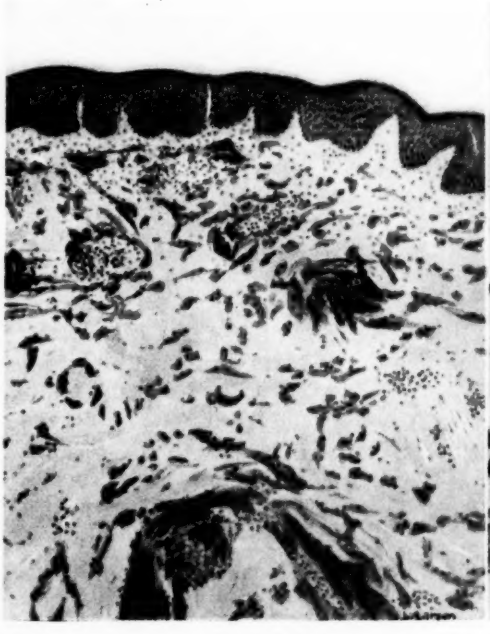

FIG. 2 (ALLEN AND HOWARD). FROZEN SECTION OF SKIN (XANTHOMA DIABETICORUM).

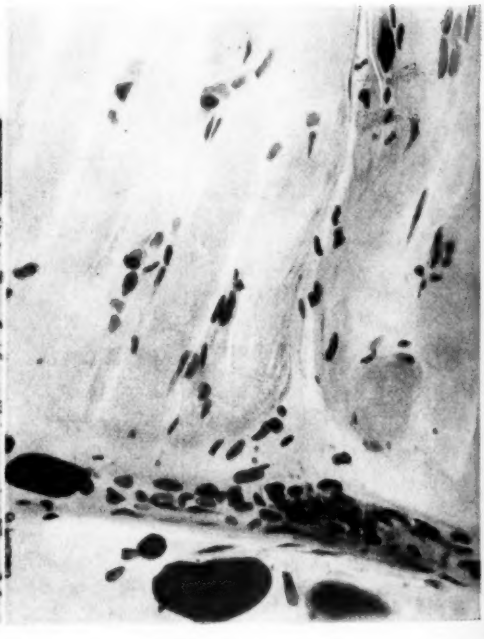

FIG. 3 (ALLEN AND HOWARD). FROZEN SECTION OF DELTOID MUSCLE SHOWING FAT IN THE LUMEN OF AN ARTERIOLE, IN CELLS OF THE VESSEL WALLS, AND IN MONONUCLEAR CELLS IN THE PERIVASCULAR TISSUES.

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LIPEMIA RETINALIS

Report of a case

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IOWA CITY

Lipemia retinalis was observed in an 11-year-old girl admitted to Children's Hospital in diabetic coma. In addition to the usual changes in intraocular lipemia, the fundi assumed a darker color during the period of recovery. A small, retinal hemorrhage occurred in the left eye during the second day, but disappeared completely within a week. On admission blood sugar was 335 mg. percent, cholesterol 2454 mg. percent, lipoid phosphorus 76 mg. percent and lecithin 1900 mg. percent. Retinal signs of lipemia persisted practically unchanged for three days even though the blood-fat values diminished sharply within 32 hours after admission. A Sudan-III stained frozen section of deltoid muscle taken 72 hours after admission revealed free and phagocytosed fat in vessel walls and perivascular tissues. The possibility of fat storage in the retinal vessels and surrounding tissue is discussed. From the Departments of Ophthalmology and Pediatrics, College of Medicine, State University of Iowa.

Lipemia has been recognized as a complication of several pathologic conditions but ocular manifestations of this altered state of the blood have been reported only in association with diabetes mellitus and in one case of leukemia. Although lipemia is not at all uncommon in diabetes, ophthalmoscopic evidence has been reported in only 47 cases.[1, 2] In one other case in which similar fundus changes were reported the lipemia occurred during the course of a leukemia which had been treated with radium.[3]

The first case with visible changes in the retinal vessels was described by Heyl;[4] he proposed the name lipemia retinalis for the striking fundus changes observed in a diabetic patient who soon passed into fatal coma. Further observations led to the conclusion that lipemia retinalis, even though rarely present, was invariably an indication of impending death. However, since the introduction of insulin therapy, this prognostic significance has been lost.

Some of the more recent authors have shown that lipemia alone probably is not responsible for the fundus changes. They found that the circulating fat had to be in a state of emulsion, and that an acidosis also was necessary to reproduce the retinal signs.

Case report. M. N., an 11-year-old girl who had been comatose for several hours was admitted to Children's Hospital on October 4, 1935. Her illness, as described by an aunt, had begun in May with the appearance of polydipsia and polyphagia, followed by loss of weight, polyuria, and nocturia. Because of glycosuria, the family physician placed her on a diet of vegetables, fruit, cream, milk, butter, meat, and eggs, but no sugar or starches. The child regained the lost weight with an abatement of her other symptoms even though insulin was not administered, but her urine continued to show small amounts of sugar. However, on returning to school early in September, she again lost weight, then on September 30th became tired, listless, and lost her appetite. Several small, elevated, yellowish skin lesions appeared on her arms, neck, and forehead. These symptoms persisted until the morning of October 4th when she refused food, drank very little, vomited repeatedly, and lapsed into coma.

Physical examination revealed a thin, dehydrated, undernourished, blond girl in deep coma, with a strong odor of

acetone on her breath. Respirations were typically Kussmaul in type, full, deep, and rapid (35 per minute). There were several small, elevated, golden-yellow lesions in the skin of the face, neck, and arms. The intraocular tension was low to palpation.

Laboratory findings on admission revealed an extremely high fat content in the blood, the cholesterol being 2454 mg. percent, lipoid phosphorous 76 mg. percent, and lecithin 1900 mg. percent. The blood sugar was 335 mg. percent (tables 1, 2, and 3). The urine contained a large amount of sugar and diacetic acid. The blood showed 82 percent hemoglobin (Sahli); a red count of 4,300,000; a white count of 13,450 cells; and a differential count of 64 percent polymorphonuclear leucocytes, 27 percent small lymphocytes, 8 percent large lymphocytes, and 1 percent eosinophiles. These findings confirmed the clinical diagnosis of diabetic acidosis, and vigorous treatment, consisting of intravenous injections of 5 percent glucose in Ringer's solution, combined with adequate amounts of insulin, was started immediately. Individual dosages and adequacy of therapy were measured by chemical data rather than by clinical improvement.

Table 1

BLOOD-FAT STUDIES*
(Expressed in mg. per 100 c.c. of blood)

Dates	Cholesterol	Lipoid Phosphorous	Lecithin
Oct. 4 1:00 p.m.	2454	76.0	1900
7:00 p.m.	1490	40.0	1000
Oct. 5 7:30 p.m.	467	23.0	575
Nov. 16	238	9.9	248
Normals	100–230	7–10	250–450

* Determinations made by Doctor Genevieve Stearns using the Myers-Wardell method for cholesterol, and the Bloor method for lipoid phosphorous and lecithin.

The first ophthalmoscopic examination was made on the morning after admission, during the daily routine ophthalmic examinations of pediatric cases. The patient was semicomatose even though vigorous therapy had been administered for 21 hours. The media were clear except for a small opacity in the nuclear area of each lens. The fundi were identical in appearance. The discs were pale. The arteries and veins were broad, flat, much lighter in color than the surrounding fundus, and practically undifferentiated from each other.

Table 2

BLOOD SUGARS

Oct. 4	1:00 p.m.	335 mg. per 100 c.c.
	4:00 p.m.	348
Oct. 5	9:00 a.m.	208
Nov. 16		160

(Somogyi blood precipitation—Folin-Wu sugar determination.)

On the nerve heads the arteries were pale pink and the veins pale purplish-pink, but at the margins of the discs these colors rapidly faded into a uniform pale orange-yellow. The light reflexes were limited to the portions of the vessels showing color differentiation but even here were broad, hazy, and diffuse. Absence of the light reflexes from other portions of the vessels accentuated the flat appearance. Fairly broad, yellowish-white, marginal stripes accompanied both arteries and veins outward into the periphery. There were no other noteworthy changes in the somewhat pale, blond fundi. The intraocular tension was normal.

Table 3

URINE

Date		Diacetic acid	Albumin
Oct. 4	1:30 p.m.	3+	0
	2:30 p.m.	3+	0
	3:30 p.m.	2+	0
	6:00 p.m.	4+	0
	12:00 m.	4+	0
Oct. 5	6:00 a.m.	4+	0
Oct. 6		1+	0
Oct. 7		Trace	0
Oct. 8		Absent	0

Sugar in urine throughout active therapy.

Twenty-four hours later the patient was still semicomatose. Examination of the fundi revealed little change in the

vessels, for although the salmon color of the arteries and the purplish color of the veins on the discs were slightly darker, the uniform, pale, orange-yellow color of the vessels persisted in other regions. However, there was a small, round, retinal hemorrhage in the left eye, just below a horizontally coursing branch of the inferior temporal artery, approximately 1½ disc diameters from the inferior temporal margin of the nerve head (fig. 1). The hemorrhage was bright red, forming a sharp color contrast with the surrounding fundus and the nearby artery. This hemorrhage, which had not been present at the first examination, disappeared without leaving a trace within one week.

On the fourth morning all signs of coma had disappeared, but the fundi appeared practically unchanged. The next day, however, the vessels were approximately normal on and around the disc, but peripherally were still definitely characteristic of lipemia retinalis. The nerve heads appeared normal. At this time it was noted that the fundi, although still of the blond type, were much darker orange-red in color than they had been during the stage of coma. On the sixth day the fundi were normal except for traces of the rapidly disappearing, small, retinal hemorrhage in the left eye.

Slitlamp examinations were made a few days later. In addition to the previously mentioned nuclear opacity of each lens, an occasional iridescent crystal was seen in the anterior and posterior subcapsular regions.

Two ophthalmoscopic findings were of especial interest. The first was the pallor of the fundi, observed in retrospect when the eye grounds later assumed a darker color. Although Heyl[4] described pallor of the fundi as one of the manifestations in his case, the patient had not been seen until after the lipemia retinalis had developed. Other early reports did not mention this sign. As a result the authors had difficulty in explaining the apparently normal color of the fundus as contrasted with color changes of the retinal vessels. In view of the observations in the present case, their difficulty was probably due to persistence of the lipemia and rather rapid, fatal termination. The second interesting ophthalmoscopic finding was the small, round, retinal hemorrhage in the left eye, which was seen on the third day and disappeared without leaving a trace in the course of a week. Retinal hemorrhages have been reported in one other case.[5]

Two of the skin lesions and a small piece of underlying deltoid muscle were removed for microscopic examination on the fourth day of hospitalization. Parts of these tissues were prepared by frozen section, stained with Sudan III, and counterstained with hematoxylin. The remaining portions were sectioned in paraffin and stained with hematoxylin-eosin. The pathologic changes in the skin were typical of xanthoma diabeticorum (fig. 2). Pathologic changes were not observed in the muscle sections stained with hematoxylin-eosin, but an unusual distribution of fat was observed in the frozen sections. There were numerous, various-sized, fat droplets within the lumina of the vessels, a few in the medial and intimal layers of the walls, and others in the perivascular lymph spaces (fig. 3). The vessel walls contained occasional cells filled with fat and numerous mononuclear cells containing fat were found in the perivascular tissues. Because of this unusual distribution of fat, it was believed that similar conditions probably prevailed in the retina. However, Heine,[6] Reis,[7] and certain other early authors,[8] working with fat stains, were unable to find fat outside of the lumina of the retinal vessels in cases of lipemia retinalis. Therefore, they were forced to explain the changes in the appearance of the vessels on the basis of alterations of the physical optical properties resulting from the emulsification of the large amount of fat in the blood serum. This explanation undoubtedly accounts for the majority of retinal manifestations. Probably it is sufficient when the condition is of short duration, but in the present case it is doubtful if alteration of the blood alone accounted for all of the signs of lipemia retinalis. In the first place, the history

of an inadequate diet, rich in fat, together with the history of loss of weight and xanthomatosis, warrant the assumption that the lipemia had been present for some time and had reached its high level gradually. In the second place, the muscle biopsy, taken 72 hours after admission, revealed phagocytosed fat in perivascular tissue as well as in vessel walls. In the third place, the retinal signs of lipemia were practically unchanged for 72 hours after admission although the blood fat was reduced sharply; for example, blood cholesterol was lowered 1987 mg. percent in the first 32 hours (table 1). The history suggests the possibility of fat storage before the institution of therapy; in addition, Bloor has been quoted,[1] "as suggesting that the sharp initial decrease in the blood fat value, such as that seen in these cases, may be due to changes in the permeability of tissues to fat. The amount of fat which disappears is far too large to be accounted for by oxidation; hence it must be stored." Marble and Smith[1] add, "We have shown (with Prof. C. K. Drinker and Dr. M. E. Field) that in the normal dog there probably exists a slight but definite permeability of the blood capillaries to fat, and it is reasonable to suppose that the degree of permeability may at times be increased." For these reasons it seems logical to conclude that the persistence of signs of lipemia retinalis in this case was due to the presence of fat in the walls of the retinal vessels and perhaps also in the surrounding retina. Therefore, it is suggested that the pathology of lipemia retinalis needs further investigation should the opportunity arise; also that the retina should be studied with fat stains and that this study should be correlated with the duration and severity of the lipemia as well as with fat-stained sections from other organs.

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AN ANALYSIS OF RECENT STUDIES ON THE ETIOLOGY OF TRACHOMA

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Pertinent trachoma studies of the past few years have been analyzed and the following conclusions as to etiology have been drawn: (1) Trachoma is a specific communicable disease. (2) It is not caused by a specific bacterium nor by repeated infection with ordinary conjunctival bacteria. (3) The etiologic agent belongs to the group of filtrable viruses. (4) The particle size of the virus is probably relatively large. (5) The virus may be identical with the elementary body of Prowazek and Halberstaedter. From the Department of Ophthalmology, College of Medicine, University of Iowa. Read before the Chicago Ophthalmological Society, December 16, 1935.

Trachoma has been studied extensively during the past five years, and in this country systematic programs for determining the etiology of the disease have been undertaken by the University of Iowa and by Washington University. Definite progress has been made and it now seems worth while to analyze available reports and to draw such conclusions as the evidence warrants. In this survey no attempt is made to review the entire literature, only pertinent reports of recent date being cited.

Trachoma is a specific communicable disease

The communicability of trachoma has been confirmed by the inoculation experiments of Michaïl and Vancea,[1] and of Thygeson,[2] in which trachomatous materials were transferred directly to normal human conjunctivae, and by the experiment of Thygeson, Proctor, and Richards[3] in which filtered material produced trachoma in a human volunteer. The susceptibility of the monkey conjunctiva to trachoma has been demonstrated by Julianelle and Harrison[4] and by Stewart.[5]

The specificity of the disease is indicated by the fact that the human inoculations have resulted in typical clinical trachoma. No conclusions as to specificity are derivable from monkey inoculations since the induced infection lacks the diagnostic signs of pannus and scarring; experimental trachoma in monkeys is a granular conjunctivitis and cannot be differentiated with certainty from Bacterium granulosis conjunctivitis,[6] inclusion conjunctivitis,[7] or spontaneous folliculosis.

Dietary deficiency as an etiologic or contributing factor seems to have been definitely ruled out by the studies of Hetler and James[8] who found that monkeys (M. rhesus) on deficient diets were not more susceptible to trachoma than monkeys on adequate diets. Rice and co-workers,[9] at the United States trachoma hospital at Rolla, Missouri, failed to find clinical improvement in patients fed on adequate diets reinforced with vitamin A. Abundant clinical records are available to show that trachoma occurs in individuals on adequate diets; for example, trachoma in wrestlers.

Trachoma is not a specific bacterial disease

No specific bacterium has been demonstrated as the cause of trachoma. While Bacterium granulosis (Noguchi[10]) has been shown[11] to produce in monkeys a follicular disease resembling trachomatous infection, it has been eliminated as a causal factor for the following reasons: (1) it has not been found with sufficient constancy in the lesions of the disease, by either bacterioscopic or cultural methods, to indicate etiologic significance (Julianelle and Harrison,[12] Bengtson,[13] Wilson,[14] Thygeson,[15] and others); (2) it has not produced trachoma when inoculated in the human conjunctiva (Wilson,[16] Proctor and co-workers,[17] Proctor, Finnoff, and Thygeson,[18] Thygeson,[19] Nicolle and Lumbroso,[20] and many others); (3) tissue transfer from Bacterium granulosis conjunctivitis of the M. rhesus to the human conjunctiva did not induce trachoma;[19] (4) trachoma has been induced with material not containing Bacterium granulosis (testicular passages of Julianelle and Harri-

son,[21] filtration experiments of Thygeson and Proctor,[22] and of Thygeson, Proctor, and Richards[3]).

Other bacteria occurring on the trachomatous conjunctiva have been eliminated as causal agents by inoculations of pure and pooled cultures on the human conjunctiva (Thygeson[15]) and on the monkey conjunctiva (Julianelle and Harrison,[21] Stewart[5]).

Trachoma is not due to repeated infection with nonspecific bacteria

Whereas trachoma has been transmitted to monkeys, attempts to transmit ordinary bacterial conjunctivitis have failed (Stewart[5]). Trachoma has been seen to start and to progress through its usual course with pannus in the absence of pathogenic bacteria (Thygeson, Proctor, and Richards[3]). Over a three-year period no clinical evidence was found to indicate that nonspecific chronic conjunctivitis is capable of developing into trachoma.[23]

Trachoma is a virus disease

Evidence obtained from three different methods of attack on the problem now indicates that trachoma belongs to the group of virus diseases.

1. **Evidence obtained through a process of elimination.** Julianelle and Harrison[21] made extensive inoculations in the conjunctiva of the M. rhesus, using pure cultures or cultures of bacteria pooled in the proportions found on the trachomatous conjunctiva, without result. Stewart[5] inoculated 30 baboons with various conjunctival bacteria including staphylococci, gonococci, streptococci, Koch-Weeks, and influenza bacilli, with negative results. Thygeson[15] inoculated all forms of bacteria isolated from 63 cases of trachoma into the human conjunctiva without producing the disease. In view of the consistently negative results of these experiments and of the many other inoculation experiments recorded in the literature of the past 50 years the negative rôle of the conjunctival bacteria in trachoma should be accepted.

There is no morphologic evidence to indicate that a noncultivable bacterium* or protozoon is concerned in the etiology of the disease.

2. **Evidence obtained from filtration experiments.** Filtration experiments in trachoma have for the most part been negative. In 1913, however, Nicolle, Cuénod, and Blaizot[24] reported positive results in two experiments with modified Berkefeld-V filters. Of particular significance was the fact that, in one experiment, the infection in the chimpanzee inoculated with filtrate was proved to be trachomatous by transfer to a blind human eye. In recent years negative filtrations have been reported by Lumbroso and Thygeson,[25] Candian,[26] and Stewart.[5] Julianelle and Harrison[27] obtained infection with Berkefeld-V filtrates in three of 44 animals, a result which they considered unimportant in view of the large proportion of negative results. They concluded that the agent of trachoma was generally not filterable.

The varied results from filtration experiments led Thygeson, Proctor, and Richards[3] to examine the technique used by Nicolle and co-workers in their sharply positive filtrations. In order to reduce loss of active agent in the filter, the French workers had employed a disc of Berkefeld-V substance cemented into the end of a glass tube. It seemed reasonable, therefore, that the inactivity of filtrates might be due primarily to adsorption of the agent rather than to large particle size. Experiments were conducted, therefore, in which a high virus content of the suspension was insured by the use of pooled epithelial scrapings from selected cases in Indian children with active disease. Loss in the filter was controlled by the use of Elford[28] gradocol membranes which become saturated with very little virus. In four experiments on baboons, using 0.75-micron membranes (membranes of largest pore size which will retain conjunctival bacteria), bacteria-free filtrates were found to be active. To eliminate the possibility that inclusion-

* Rickettsialike bodies have been described by Busacca and by Cuénod and Nataf in follicular material from trachoma. Their significance has not yet been established.

conjunctivitis virus was present and had produced the lesions in the monkeys, a single inoculation on a human eye was made with a filtrate which had passed a 0.6-micron membrane. The result was positive.

3. **Evidence obtained by inoculations with bacteria-free trachomatous material.** Julianelle and Harrison,[21] using the method of testicular inoculation which Noguchi developed to rid vaccine virus of contaminating bacteria, were able to obtain active bacteria-free trachomatous material capable of inducing infection in monkeys.

Properties of trachoma virus

Very little is known concerning the properties of trachoma virus. The experiments of Stewart[5] indicate that it survives mechanical procedures such as centrifugation and grinding; that it survives for at least 24 hours in a mixture of inactivated human serum and Tyrode solution, pH 7.4; but that its activity is quickly destroyed at pH 6.4 either in distilled water or Tyrode solution. Reports as to the survival of the virus in glycerine are at variance.

Nature of trachoma virus

Filtration experiments with collodion membranes of graded pore size have shown that viruses vary greatly in particle size; some, like foot-and-mouth-disease virus, are very small (8-12μμ), and others, like vaccinia virus, are relatively large (125-175μμ). In suitably stained preparations these larger viruses are resolvable under the microscope as minute coccuslike granules, known as elementary bodies.[29] In the case of vaccinia virus, fowl-pox virus, and certain others, they are about 0.25 microns in diameter when stained. Most of the viruses of large particle size filter with difficulty, whereas small viruses, such as that of foot and mouth disease, readily pass the ordinary bacterial filters.

The fact that trachoma virus filters with difficulty suggests that the particle size may be relatively large. Elementary bodies, resembling those in other virus diseases, have been known to exist in trachoma since their description by Halberstaedter and Prowazek[30] in 1907. They were noted both free in the secretion and massed together in the cytoplasm of the conjunctival epithelial cells to form the so-called Halberstaedter-Prowazek inclusion bodies.

The presence of these bodies in trachoma has been reported by investigators from all parts of the world, but no general agreement as to their nature or as to their etiologic relationship to trachoma has been reached. The investigations of Stewart,[31] Bengtson,[32] and Julianelle and Harrison[33] have not supported the claims of Halberstaedter and Prowazek. In Egypt, Stewart found the bodies only in trachoma complicated by secondary bacterial infection and concluded that they were the granular products of cellular digestion of phagocyted conjunctival bacteria, particularly the Koch-Weeks bacillus. In a later report[34] he suggested that the elementary bodies were a granular virus which had been introduced into the conjunctival epithelial cells by way of phagocyted bacteria. Bengtson* considered the bodies of probable etiologic importance but believed them to be of bacterial origin. Julianelle and Harrison found trachomatous material in which they could not demonstrate the bodies to be infective and also noted the apparent absence of the bodies in experimental trachoma of the Macacus rhesus.

The investigations of Taborisky[35] and of Thygeson[36] and of Thygeson, Proctor, and Richards[3] have supported the identification of the elementary body with trachoma virus. The findings of the latter observers may be discussed under the following headings:

1. **Relative specificity of the Halberstaedter-Prowazek elementary body.** The elementary body was not found on the normal conjunctiva. A survey of a thousand cases of conjunctivitis indicated that it was to be found only

* In a report appearing while this article was in press, Bengtson (Amer. Jour. Ophth., 1936, v. 19, p. 229) concludes that the inclusion body is concerned etiologically in trachoma.

in trachoma and in the nonbacterial conjunctivitis generally known as inclusion conjunctivitis (inclusion blennorrhea, swimming-pool conjunctivitis).

2. **Nature of the elementary bodies of inclusion conjunctivitis.** The abundance of elementary bodies in inclusion blennorrhea and the harmlessness of the disease offered opportunities for study not possible in trachoma. It was shown[7]: (1) that the elementary bodies were constantly associated with the disease; (2) that they were absent in conjunctivitis of known bacterial origin; (3) that the occasional saprophytes found in the disease were not concerned etiologically; (4) that multiplication of the elementary bodies occurred when the disease was transferred to a new host; (5) that bacteria-free filtrates containing elementary bodies were capable of producing the disease; and (6) that filtrates not containing elementary bodies were not infective. It was concluded, therefore, that the elementary body was the virus and that the inclusion bodies were cytoplasmic colonies of the virus.

3. **Nature of the elementary body of trachoma.** The studies on the elementary bodies of inclusion conjunctivitis supported the view that the morphologically identical trachoma elementary body was of virus nature. Its similarity to psittacosis virus[37] in morphology and staining reactions was also highly suggestive.

4. **Probable identity of the trachoma elementary body with trachoma virus.** Evidence supporting the theory of identity of elementary body and virus: (1) presence of elementary bodies in an infective filtrate[3] (elementary bodies found in material used for filtration, in filtrate, and in experimental disease); (2) presence of elementary bodies in four cases followed from onset; (3) presence in trachoma in numbers corresponding to clinical severity of disease; for example, in seven cases of trachoma with acute or subacute symptoms but without secondary bacterial infection there were large numbers of elementary bodies, whereas, in chronic cases they were relatively few; (4) elementary bodies have been present in a larger percentage of cases than would be expected of a secondary invader: Tunisian series 44 percent, unselected American series 40 percent, selected (for transmission experiments, on the basis of activity) American series 92 percent. Evidence opposing the theory of identity of elementary body and virus: (1) the elementary body has not been found in 100 percent of cases of trachoma; (2) it has not been found in experimental trachoma of the M. rhesus.

Thygeson[23] considers the failure to find elementary bodies in all cases of trachoma not incompatible with etiologic significance in view of (1) difficulty of morphological demonstration due to minuteness of bodies; (2) absence of a cultural means of demonstration; and (3) chronicity of disease. He interprets the failure to demonstrate the bodies in the experimental infection of the M. rhesus as being due probably to the mild character of the induced disease, since in two transmission experiments to human eyes the bodies were demonstrated without difficulty.

Summary

Recent studies support the conclusion that trachoma is a virus disease. Evidence has been advanced which identifies the elementary body of Halberstaedter and Prowazek with trachoma virus, but no general agreement among investigators on this point has as yet been reached.

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THE SCREEN TEST AND ITS APPLICATIONS

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Any test used for the diagnosis of muscle imbalances must be accurate, precise, and quickly applicable in a large percentage of cases. It should make possible the measurement of phorias as well as trophias and should not be dependent on binocular vision. It should be applicable to very young children. The more objective the test can be made the better.

The screen test with its modifications, screen-Maddox rod, and screen-comitance, are described in detail after the physiology and mechanics of the ocular movements have been briefly discussed, and cases are cited to emphasize the benefits of these tests. Cases of combined vertical and lateral deviations are described and the importance of measuring the combined deviations stressed.

The tendency in some cases of lateral strabismus to a change from convergent to divergent squint, or vice versa when a vertical deviation is present, is discussed. Cases are cited in which this developed following operation for the lateral deviation, the vertical deviation having remained uncorrected. The same change in deviation has been observed when operation has not been resorted to. The screen test is the only test in the writer's experience that is applicable in all cases in which vision is sufficient for central fixation.

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Any test used for the determination of imbalance of the ocular muscles must be: (a) accurate, (b) precise, (c) quickly applicable in a large percentage of cases. It should make possible (d) the measurement of tropias as well as of phorias; (e) the measurement of the amount of deviation when suppression is present and binocular vision is impossible. (f) It should be accurate in children too young to appreciate double images as required by many of the tests. (g) The more objective and the less subjective the test the better.

Many of the tests in vogue are purely subjective and measure only the phorias and the lesser amounts of tropias when suppression is not present.

Most tests measure the deviation for distance only, while some measure it for both distance and near, but only in the primary position. If a measurement is desired in the six cardinal fields, an entirely different test is necessary, which may alter the fusion tendency entirely.

Duane in an article on the parallax test, written in 1895, stated, "As far as my experience goes, the impulse towards bringing two dissimilar images into line is almost as strong as when the images are alike." This has been

the writer's experience in many cases, so many, in fact, that one is not safe in relying on any test which depends entirely on dissimilar images. The difference between these tests and the screen test is that the screen test measures more nearly the total amount of deviation, while the other tests measure only the amount that cannot be overcome, or the amount that the deviation is increased by a convergence action in binocular vision. This may vary by many degrees in different individuals or in the same individual at different times.

If the screen test fills the requirements just stated and has so many advantages, why then has it not been more generally adopted?

There are three evident reasons for this:

First, Duane wrote so completely and scientifically concerning the test that it seemed too difficult to many, hence they looked for something more simple. The test, as made by him in his office, however, was simplicity itself.

Second, the test needed no expensive instruments and the instrument houses had expensive instruments for sale before which a patient could be seated. By turning a few levers, the diagnosis and treatment (almost) would be stamped on the history card. Hence, the screen test received no advertising, but instead was ignored.

Third, the test needed experience in making the examination and a knowledge of the underlying principles of the motor apparatus of the eyes which seemed to be unnecessary in the other methods.

For these reasons, chiefly, the test has not been generally accepted, except in a very superficial way.

Before considering the application of the test, it would be better to consider the normal physiological function of the ocular muscles.

One has to consider first the action of each individual muscle per se. Second, the action in associated movements as controlled by the cortical or subcortical area. Third, the act of convergence as controlled by the convergence center. Fourth, the function of divergence as controlled by the divergence center. Fifth, the function of sursumvergence with strong evidence of a center controlling the vertical adjustments, and sixth, the function of rotation as shown by the position of the vertical meridians of the corneae.

The outer wall of the orbit forms an angle of 45 degrees with the nasal wall, and with the visual axis of the eye in the primary position, an angle of 26 degrees. The external rectus and the internal rectus are the only muscles that have at all times a straight line of traction and hence an uncomplicated action. Since the superior and inferior recti have their origins at the orbital foramen, the direction of each muscle is forward and outward. This causes the muscles, when the eye is in the primary position, to make traction at an off axis of approximately 26 degrees. Considering the eye as rotating on a vertical, horizontal, and antero-posterior axis, such an angular action would cause the superior rectus to elevate the eye on the horizontal axis, to adduct the eye by acting on the vertical axis, and to intort the eye by the action on the antero-posterior axis. The inferior rectus in the primary position depresses the eye on the horizontal axis, adducts on the vertical axis, and extorts on the antero-posterior axis. Since there are these three actions of each muscle in the primary position, the actions would be simplified if the traction could be made straight. This can be done by rotating the eye to the outer canthus, mainly by the action of the external rectus. In this position, the superior rectus, having a straight line of traction, is practically a pure elevator. The inferior rectus, working parallel to it, would then in this position be a pure depressor.

Since the effects of duction and torsion are caused by the off-axis tractions, these effects would be increased as the angle of the traction is increased. This would be in the nasal field.

A like condition is present with the oblique muscles, except that the off-axis pull is somewhat greater than 26 degrees. In the primary position the interior oblique elevates the eye on the

horizontal axis, abducts on the vertical axis, and extorts on the antero-posterior axis. The superior oblique, in the primary position, depresses the cornea on the horizontal axis, abducts on the vertical axis, and intorts on the antero-posterior axis. When the cornea is well in the nasal field, these two muscles have almost a straight line of traction. Hence, in this field, the inferior oblique is almost a pure elevator, while the superior oblique is almost a pure depressor.

Since, in the primary position, the elevators and depressors each have three functions, making twelve functions to watch in each eye, or twenty-four in all, and, added to this, the function of associated movements, convergence, divergence, and sursumvergence, it is small wonder that the question becomes complicated. It seems reasonable to assume, however, that if an elevator or depressor is under-acting or over-acting, as such, it is doing the same thing in its other functions; hence, if, for instance, a superior rectus fails in elevating the cornea in the temporal field, one can assume that the under-action is also present in the function of adduction and intorsion in the nasal field, and all functions are least affected in the primary position. All one needs to do, then, is to test the elevators and depressors in the field in which the act of elevation and depression is greatest, and the diagnosis is made from the comparative amount of elevation or depression of the eyes alone, disregarding their secondary actions of torsion, abduction, or adduction.

With these physiological actions of the extraocular muscles in mind, what could be the cause of an exophoria? It could be brought about by the weakness of one or both interni, or by an over-action of one or both externi. It could also be produced by an under-action of the convergence power with normal interni in their functions of adduction. It could also be caused by an excess of the divergence function. In itself, then, the finding of an exophoria means nothing until the test is repeated for the near point. It still means little, unless the test is made when the eyes are turned to the right and to the left. If the exophoria or exotropia is greater for distance than for near and does not increase in looking to the right or to the left, a diagnosis of a primary divergence excess can be made. If the exophoria or exotropia is greater for near than for distance, a convergence insufficiency or paralysis is present, provided, again, the deviation does not increase when the eyes are turned to the right or left. If the divergence of the visual axes increases in looking to the right, there is a paralysis, more or less marked, of the left internus or, more rarely, a spasm of the right externus. If the deviation increases in looking to the left, the conditions are reversed; that is, a paralysis of the right internus or a spasm of the left externus. If the exophoria or exotropia increases in looking to both the right and to the left, there is a paralysis of both interni. The exophoria or exotropia of a divergence excess or of a convergence insufficiency is never more, and usually it is less, in looking to the right or left than it is in the primary position.

An esophoria may be due to a weak power of divergence or divergence insufficiency or paralysis; to an overly powerful converging power (convergence excess or spasm), or, again, it may be due to a weak external rectus or to a too powerful internal rectus.

This may be determined by measuring the amount of deviation for distance, near, and when looking to the right and to the left.

If a right hyperphoria is found by any test in the primary position, what does it mean? The test shows only that the right eye is higher than the left eye. This may be produced by an excessive power of sursumvergence, to an under-action from any cause of the depressors, or to an over-action of the elevators of the right eye. It could also be brought about by an under-action of the elevators, or to an over-action of the depressors of the left eye. In a left hyperphoria, the reverse is true. To determine which muscles are involved, the deviation must be measured in the upper and lower corners. This, to be sure,

tests the associated muscles in their respective fields as elevators or depressors only, but if found defective, or excessive, as such, they are over- or underacting in their secondary functions of adduction, abduction, or torsion, as has been previously stated; although these functions seem in many cases to be compensated for by the action of the other muscles. Primary paralyses are very common, while primary spasms are quite infrequently seen. However, secondary contractures of direct antagonists and secondary deviations of the associate muscles are very common.

It is necessary, then, in order to make a definite diagnosis, to know not only the amount of deviation for distance and for near but also in the six cardinal positions as well. The screen test is most satisfactory, for all measurements can be made by it. This should be followed by the screen-comitance test, to be described later.

The screen test

The application of the screen test is simple. One must have good illumination, for the results depend on the observations of the examiner.

As a test object for distance, a spotlight, candle, or any definite object may be used. The usual distance is 20 feet, but since a phoria at 20 feet may be a tropia at 100 feet, or vice versa, the distance is often varied. For near, a spotlight or an ink spot on a card may be used. For small children, the object should be anything that will attract and hold their attention.

The screen preferred by the writer is a card, 15 cm. by 6 cm., of sufficient thickness not to be too flexible. The screens on the market are circular discs slightly larger than the eye, and one's attention is more taken up with watching the screen and its position before the eye than with the movement of the eyes themselves. The screen should be passed from one eye to the other, far enough out not to strike the nose. It is not necessary to place the screen against the eye or the glasses. The rapidity with which the screen is moved depends on the promptness with which the patient fixates with the eye from which the screen has been removed.

The amount of deviation is measured by placing before the eyes prisms of strength sufficient to stop all movements, or better, slightly to overcorrect. One or two centrads are deducted if overcorrected. The prisms are placed base in, for exophoria or -tropia; base out, for esophoria or -tropia; base down before the right eye, or base up before the left eye, for right hyperphoria or -tropia, and the reverse for a left hyperphoria or -tropia.

In combined lateral and vertical deviations, one prism is held base in or out, while another is held base up and down, as the case may require; thus correcting both deviations at once. It is an interesting observation that, frequently, when the vertical deviation is corrected, the lateral deviation becomes much reduced.

The prism should be held in the symmetrical or postero-normal position. An objection has been made to the test; namely, that the prism could not be held accurately enough for precise testing. Duane experimented with this and found that a prism of 35$^{\Delta}$ must be held 10 degrees from the symmetrical position to make a difference of 2 degrees in the result. This amount could not occur in careful testing nor would a difference of 2 degrees in a total of 35$^{\Delta}$ change the diagnosis. In deviations of over 40$^{\Delta}$, it is often better to divide the prism between the two eyes to prevent total deflection.

The same technique is used for distance, near, and in the six cardinal positions. The measurements for near and in the six cardinal fields are usually made at about 33 cm., but this may be varied as the case requires in order to bring out some special point.

To determine the fixating eye, first one eye, then the other is screened and uncovered, and the position of the eyes is watched to determine which is fixating. What may happen is that the fixating eye will continue to fixate when the screen is removed; or the uncovered eye may take up fixation and the formerly fixating eye become the squinting eye; or they may alternate; or the fixating eye remain fixating while the eye from which the screen has been removed turns to fixate with the eye that

is already fixating. This last condition is a phoria.

This test should be made for distance, near, and in the six cardinal positions, for it is quite frequently found that the fixating eye for distance is the squinting eye for near, or that while, for instance, a right-convergent strabismic subject may fixate with the left eye for distance and near and in looking to the right; on looking to the left the right eye may become the fixating eye in this field. One always suspects something like this if the vision of the squinting eye is 20/50 or better.

Screen-Maddox-rod test

In the lesser, vertical deviations, the screen-Maddox-rod test, as described first by Maddox, is valuable. In making the test, the rod is placed before one eye. This eye is then screened and uncovered and the position of the light streak is noted. A prism is now placed before the eye, of sufficient strength to cause the image of the rod to bisect the spot of light or candlelight when the screen is first removed. The rod is then placed before the other eye, and the test repeated. In some, a right hyperphoria will be shown in either case; at times, more right hyperphoria is shown when the rod is before one eye than when it is before the other. The eye taking the greater amount of prism is showing a secondary deviation.

Again, when the rod is placed before the right eye, a right hyperphoria may be shown, but when it is placed before the left eye, a left hyperphoria may be present. The hyperphoria may be of equal amounts or one hyperphoria may be greater than the other. These are the cases of double hyperphoria, due to a paresis of the same elevator or depressor in each eye, they are rarely due to a vertical divergence, as has been claimed. The superior recti are the muscles most commonly paretic and next the inferior recti. The same double hyperphoria occurs with the obliques but much less frequently.

Screen-comitance test

A further use of the screen test is the screen comitance test. To make the test, each eye in turn is screened while the other eye fixates, the examiner watching the movements of both eyes. This test is made in the six cardinal fields and is by far the most satisfactory method of determining primary paralyses, secondary deviations, and secondary contractures.

The analysis of a few cases will make more evident the benefits of the screen test.

Case 1. The eyes of a child, aged 9 years, had crossed at times only. The screen test showed an esophoria for distance of 4^{Δ}, and slightly less for near. There was a hypermetropia of 1.5 D., the correction of which did not lessen the esophoria. With the eyes turned to the right, the esophoria increased to 9^{Δ}, and with eyes left, decreased to 3^{Δ}. In this case a homonymous diplopia was present in the extreme right field, but this subjective test was only confirmatory. It was not needed to clinch the diagnosis of a paresis of the right external rectus and not a convergence excess, for which she had been treated. The screen-comitance test would have made this still more evident.

Case 2. The screen test for distance and near showed only a slight exophoria; however, when the test was made with the eyes looking to the right, the exophoria increased to 10^{Δ}, with eyes left there was exophoria. In the upper and lower right fields there was no hyperphoria, but with eyes up and left, there was a right hyperphoria of 3^{Δ}, and with eyes down and left, a left hyperphoria of 4^{Δ}. The increasing exophoria with eyes right indicated a left internal rectus; the right hyperphoria with eyes up and left, a left superior-rectus paresis; and the left hyperphoria with eyes down and left, a left inferior-rectus paresis. Diagnosis: an incomplete third-nerve palsy which was so slight that it could have been overlooked or misinterpreted.

By the study of cases with this method, a large series of interesting conditions has been observed, the study of which would be profitable. For example:

Case 3, a child, aged seven years, whose vision was R. 20/20, L. 20/20, whose refraction under homatropine was, O.U. +0.25 D. sph. $\eqsim$ +0.25

D. cyl., in September, 1934, showed a trace of esophoria for distance, an esophoria of 15$^{\Delta}$ for near, and a right hyperphoria of 6$^{\Delta}$. The right hyperphoria increased upon looking up and left. There was no hyperphoria elsewhere. No treatment was given and the child was told to report later. One year passed and on return she had an exotropia of 20$^{\Delta}$ for distance; of exophoria a trace for near; a right hyperphoria of 6$^{\Delta}$ which increased in looking up to the left. There was fusion with depth perception by all tests. Question—Was the right hyperphoria of 6$^{\Delta}$ responsible for the convergent strabismus for near a year ago and for the change to a divergent strabismus for distance now? Has she tired of having a convergence excess to rid herself of vertical diplopia and so has relaxed her convergence and developed a divergence excess?

Case 4. D. D., aged 2½ years. Eyes have diverged for six months. Findings: exotropia for distance and near 35$^{\Delta}$. Under atropine he showed R. +1.25 D. sph. $\bigcirc\!\!\!=$ +0.50 D. cyl. ax. 105°; L. + 1.25 D. sph. At this age and with the marked divergent strabismus, no vertical deviation was noted. Convergence training was begun but accomplished little. One year later both externi were receded moderately. This gave a very satisfactory result for about three months. At the end of this time he showed an esophoria of 13$^{\Delta}$ for distance and 16$^{\Delta}$ for near. The following year there was a hypertropia of 30$^{\Delta}$, and then a left hypertropia was evident. A full correction of the hyperopic astigmatism was given, which reduced the lateral deviation somewhat. As he became older, the vertical deviation could be more definitely measured and was a left hyperphoria varying from 4$^{\Delta}$ to 10$^{\Delta}$, increasing in looking up and right, or a paresis of the right superior rectus. It is now 10 years since he was first observed. On December 7, 1935, the vision was 20/15, right and left. The esotropia for distance and near was 20 centrads with a left hypertropia of 9 centrads, without glasses. The left hypertropia increases in looking up to the right. He has third-degree fusion with the synoptophore. Question: Did the low amount of hyperopic astigmatism have anything to do with the deviations? Why, with the degree of fusion found, should he change from an exotropia for distance and near of 35 centrads to an esotropia for distance and near of 30 centrads, after a double recession which did not limit the externi in their functions of abduction? Is it not probable that the vertical deviation was the underlying cause from the beginning?

Several such cases have been seen in consultation and with the same unhappy results following operations. Such experiences, cause one to approach all of this type with due caution and to be much less anxious to operate until at least all elements of the case can be definitely and accurately worked out.

Another case of this kind was reported in a recent paper. The history was that the man, aged 30 years, had had a marked divergent squint. An excellent operator had receded both externi, which changed the condition to a convergent squint of like amount. Chagrined at the result, the operator resected one externus. It was after this operation that the patient came to my attention, at which time there was an exotropia of 40$^{\Delta}$ for distance and near, with a left hypertropia of 20$^{\Delta}$ increasing in looking up to the right. Was the difference in level the whole cause, or only a contributing cause of the wide swing from divergent squint to a convergent squint, and then back to a divergent squint again?

Case 5. J. F. S., aged 55 years, has several interesting features. He and his brother had similar conditions. The father also had a strabismus. At the age of 20 years, he was operated on, probably a double internal-rectus tenotomy. For some years he has had a divergent strabismus much of the time.

Vision R. = 20/15 with —2.00 D. cyl. ax. 170°; L. = 20/15 with —0.25 D. sph. $\bigcirc\!\!\!=$ —1.00 D. cyl. ax. 170°. By screen test, he had an exotropia of 40$^{\Delta}$, which was reduced to 30$^{\Delta}$, when a left hypertropia of 6$^{\Delta}$ was corrected at the same time. For near there was usually an exophoria of 30$^{\Delta}$ to 35$^{\Delta}$, with a convergence near point of 90 mm. He had binocular single vision for near. The

fact that his convergence and adduction were so good, would make it seem improbable that the divergent strabismus was due to a convergence insufficiency or to weakened interni. The hyperphoria was due to a paresis of both superior recti. As the left hypertropia in looking up to the right is greater than the right hypertropia in looking up to the left, it is shown that the right superior rectus is the more paretic muscle, resulting in the predominating left hypertropia. The screen-Maddox-rod test was not a satisfactory test, due to the high exotropia for distance. Because of the good convergence near point, it would seem probable that the exotropia was not due to a convergence weakness, but to an active divergence excess. The case is much like that of the girl reported previously, who did the same thing without an operation.

This would seem to be an unusual case, still two days later, the exact duplicate was found in a girl of 14 years, except that she varied from a tropia to a phoria for distance. She had had a double recession about six months previously.

The cases are so frequently seen in low amounts of ametropia and they behave so like the cases in which there is a higher degree of ametropia, that it would seem that the ametropia had little, if anything, to do with them.

Since many do have binocular single vision with depth perception, even when well along in years, it seems probable that the divergent or convergent deviation is not from a failure of binocular single vision, but due to a desire for a more comfortable and agreeable use of the eyes.

It might be said that in this case and in case 4, there was an imbalance of the lateral muscles, due to the operation, but in case 3 the same development appeared without an operation. Neither does the theory of an anomalous position of rest seem to apply to this group.

These cases, together with the reduction in esotropias and esophorias, but especially exotropias and exophorias, when the vertical deviation is corrected at the same time as the lateral imbalance, would seem to provide quite definite proof that the vertical deviation is the cause of the lateral in many cases. A further proof is the marked reduction of a lateral deviation when the head is tilted to overcome a vertical deviation. This was marked in Duane's case, where the mother observed that when a collar was used to correct the head tilt, the eyes crossed. Without the collar, when the head was tilted well to one side, there was no crossing.

These cases to which especial attention has been directed, may seem to be a subject apart from the screen test. However, the screen test is the only test by which all of them, whether tropias or phorias, can be satisfactorily studied.

Since by use of the screen test one must depend entirely on one's own observations, it makes for much keener power of observation and for an intimacy with the functions of the ocular muscles which cannot be acquired by any other test.

15 Park Avenue.

SUPERIOR-RECTUS FASCIA-LATA SLING IN THE CORRECTION OF PTOSIS

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The author presents a procedure for the correction of ptosis in which a fascia-lata sling is placed around the middle third of the superior-rectus muscle and sutured to the tarsus. From the Division of Ophthalmology, University of California Medical School. Presented before the Pacific Coast Oto-Ophthalmological Society in Del Monte, California, April 14, 1936.

Ptosis has long been one of the difficult problems in ophthalmology. Probably the first surgical treatment was the ancient one which consisted of excising a horizontal ellipse of skin from the center of the drooping lid. Von Graefe[1] in 1880 devised a procedure in which he excised a portion of the orbicularis, on the principle of weakening the power of the opponent of the levator, thus causing a subcutaneous shortening of the lid.

Since that time many operations have been advocated, the great number being an indication of the difficulties encountered in the treatment of this condition. Only a few of these will be considered here. The first to conceive the idea of attaching the lid to a muscle was Dransart,[2] who joined the lid and frontalis muscle by means of sutures. In 1923 Lexer[3] outlined a procedure in which he attached the tarsus to the occipito-frontalis muscle by use of a strip of fascia used as a hammock. The center of this strip was attached to the tarsus and the two ends sutured subcutaneously to the occipito-frontalis just above the brow. More recently Blaskovics[4] has devised an operation that is highly successful in those cases in which the superior-rectus muscle is palsied. In this procedure a piece of the tarsus is removed and the levator, which has been resected from it, is brought forward and attached to the remaining tarsus.

Most of the cases of ptosis requiring surgery are congenital and generally bilateral. The muscular apparatus of the eye is usually normal with the exception of the involvement of the levator. In 1897 Parinaud[5] and Motais[6] conceived the idea of substituting the action of the middle third of the tendon of the superior rectus for that of the levator. Since that time the Motais principle has been most universally used. This operation is an excellent one but it has certain disadvantages. It is rather difficult to attach the small strip of tendon to the tarsus, and in some cases the sutures cut through it, thus nullifying the result. This is especially true in young children. In 1935 Bielschowsky[7] stated, "For all patients with a normally functioning superior rectus muscle, the Motais should be the operation of choice . . . but it is not advisable to operate on young children because a child's superior rectus muscle is so small and delicate, the sutures may easily cut through it." Also in the event of a failure, it is practically impossible to repeat the procedure. Occasionally a tenting effect is produced, as there is only a single point of attachment between the tarsus and the muscle. In 1907 Shoemaker[8] modified this operation by making an external incision. This was a definite step forward as it gave more suitable exposure and permitted firmer suturing of the muscle tongue to the tarsus, thus securing better anchorage. The operation, however, has most of the disadvantages of the Motais method.

Wiener[9] in 1928 advocated the operation suggested in 1902 by Cannas[10] and in 1920 by Arranquez.[11] In this procedure the levator is severed about 6 mm. from its tarsal attachment and sutured to the tendon of the superior rectus, thus attaching the tarsus to the superior rectus by means of a portion of the levator tendon. It has the advantage of being easier to perform and of being less precarious than the original Motais. However, as the levator muscle is quite thin, the sutures may cut through it in the presence of the edema which usually follows any operative procedure on the upper lid.

It has already been stated that in

ptosis the superior rectus, as a rule, is not involved. Three years ago I conceived the idea of treating these cases surgically by using a sling of fascia lata around the middle third of the superior-rectus muscle and attaching it to the tarsus. We have used this technique in a number of cases at the University of California. As the results have been more satisfactory than those obtained by other methods, I feel justified in presenting this preliminary report of the procedure.

Technique

While the eye and lid are being prepared, a strip of fascia lata 8-10 cm. long and 5-6 mm. wide is obtained. This has been done for us by one of the plastic surgeons in the following manner: A 2-cm. incision is made on the mid-lateral aspect of the thigh at the junction of the upper and middle thirds. This incision is carried down through the subcutaneous tissue until the fascia lata is exposed. The fascia is bluntly separated from the overlying subcutaneous tissue toward the knee. Two short parallel incisions are made through the fascia in the line of its fibers, about one-quarter inch apart, and the fascia is incised between them. This free end of fascial strip is passed through the loop of the fascial stripper

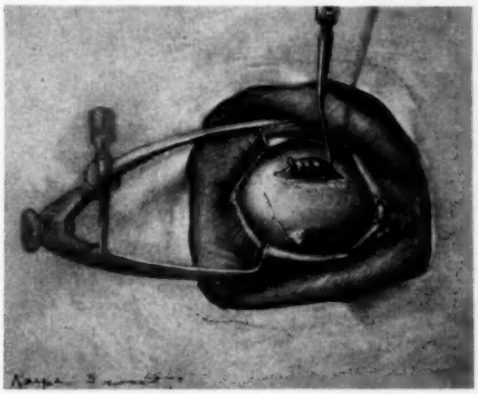

Fig. 1 (Dickey). Isolation of the superior rectus.

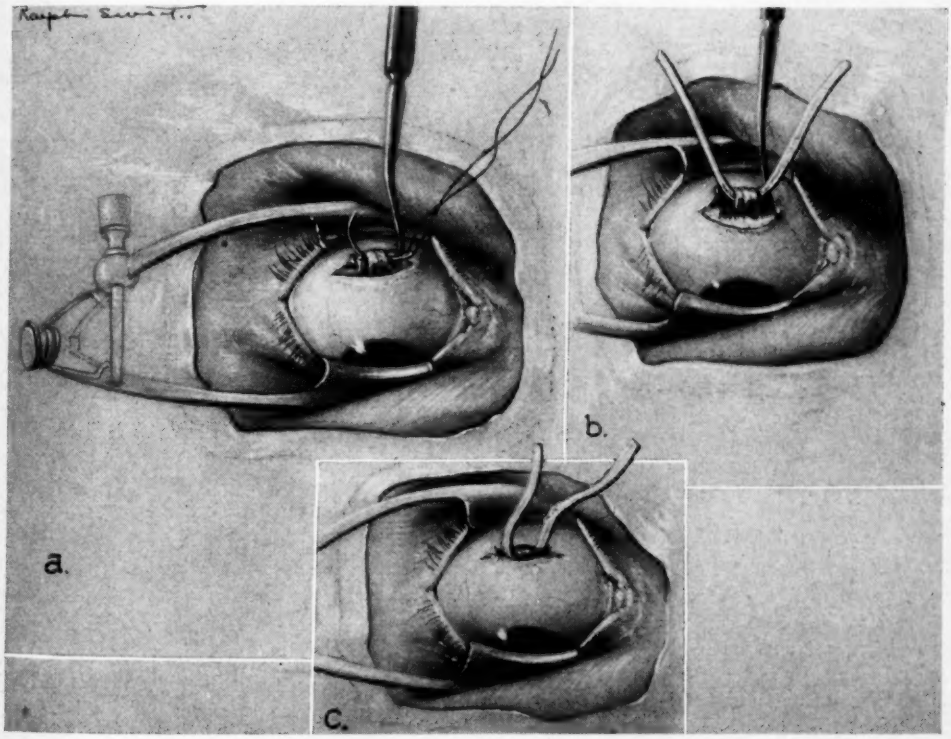

Fig. 2 (Dickey). a, Separation of the central third of tendon. b, Fascia-lata strip under the central third of tendon. c, Conjunctiva and capsule sutured.

and held taut by a heavy clamp. The stripper is forced down the thigh to the knee, where the fascial strip is cut

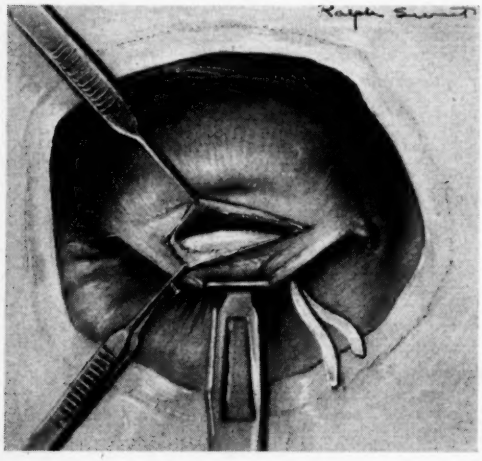

Fig. 3 (Dickey). Partial dissection of tarsus.

across by the blade of the stripper. The subcutaneous tissue and skin are closed in layers by interrupted sutures.

The superior-rectus muscle is isolated through a horizontal conjunctival incision (fig. 1). The central third of the tendon of the muscle is then isolated, but not cut, and a suture looped through it (fig. 2a). The fascia-lata strip is folded once longitudinally to give added strength and as an additional guard against slipping and tearing out of the sutures. This folded strip is then passed under the central third of the tendon of the superior rectus and the suture is withdrawn (fig. 2b). The conjunctiva and Tenon's capsule over the lateral portions of the muscle are sutured with 0000 catgut, leaving the central portion exposed (fig. 2c). The speculum is removed and a lid clamp with a conjunctival plate is clamped on

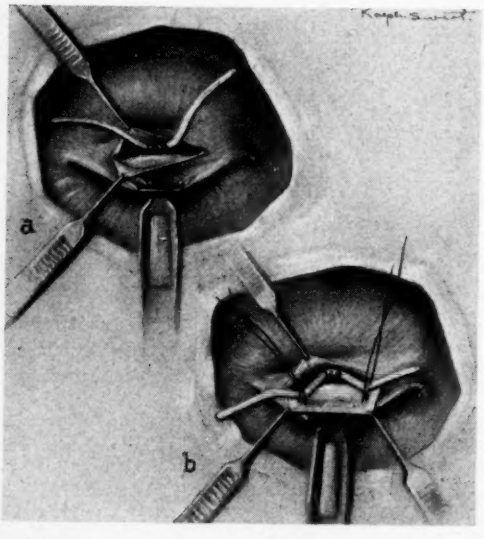

Fig. 4 (Dickey). a, Fascia brought through incision in levator. b, Sutures through fascia lata and tarsus.

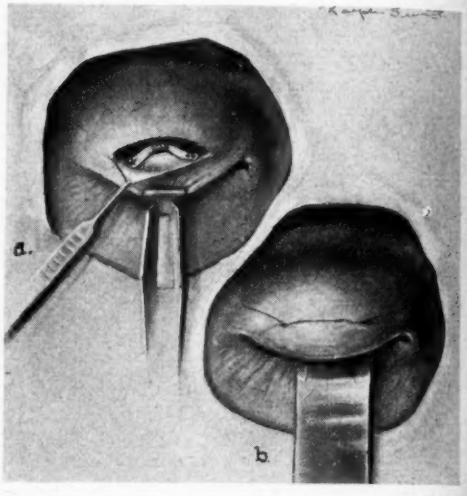

Fig. 5 (Dickey). a, Fascia lata sutured to tarsus. b, Lid drawn down showing site of incision and subcuticular stitch.

the lid. A horizontal incision 1½ to 2 cm. in length is made in the upper eyelid, parallel to the lid margin and about 8 mm. from its edge. The incision is extended down to the tarsus and the dissection is continued toward the lid margin and laterally until the tarsus has been exposed sufficiently to allow ample space for the placing of sutures (fig. 3). The upper border of the tarsus then is exposed and at the middle point just above this edge an incision 5 mm. in width is made through the fascia and tendon into the conjunctival sac. The fascia-lata strips are brought through this opening by forceps and pulled down over the tarsus (fig. 4a).

A double-armed white-silk mattress suture is placed in the tarsus at the junction of the outer and middle thirds and well down toward the lid margin. This suture is then passed through the folded fascia-lata strip (fig. 4b), is tied, and the suture cut. Another double-armed white-silk mattress suture is placed in a similar position at the junction of the inner and middle thirds of the tarsus. The lid clamp is removed and by traction on the fascia loop or sling the point is determined where the second suture should be placed through the fascia lata. One knot is tied, and if, after inspection, the position of the lid is satisfactory, the second knot is tied. The position of the lid may be varied by lengthening or shortening the fascial sling. The point chosen for the second mattress suture should be one that will lift the lid margin to a point about 3 mm. below the limbus. A second pair of mattress sutures is passed through the tarsus and fascia lata to insure a firm attachment. The excess fascia lata then is cut off close to the second suture (fig. 5a). The skin incision is closed with a continuous subcuticular suture (fig. 5b, lid drawn down to show site of incision and subcuticular stitch).

Because the skin of the lid is very loosely attached to the underlying tissue a rather marked edema frequently is found postoperatively. In all of our cases, however, this edema has subsided rather promptly with no deleterious effects. The cornea is protected by means of frequent applications of White's ointment. In the last case we used a moist chamber, which is a transparent celluloid shield under the edge of which is a pledget of cotton. This is kept soaked by regular applications of normal saline.

Case Reports

The following cases have been selected from our series.

Case 1. L.V., aged four years, was brought to the clinic because of his inability to open his eyes. Examination showed a bilateral ptosis (fig. 6). The upper rotations of both eyes were within normal limits, with no weakness of the superior-recti muscles. With the exception of the ptosis the eye examination was negative. Both lids were operated on at the same time according to the method outlined. Figure 7 shows the result five months postoperatively.

Fig. 6

Fig. 7

Fig. 6 (Dickey). Case 1, boy aged four years, before operation.
Fig. 7 (Dickey). Case 1, five months after operation.

Case 2. G. C., aged 20 months, was brought to the clinic with the history of marked bilateral drooping of the lids since birth. Examination showed a marked congenital bilateral ptosis with no involvement of the superior recti. The ptosis was so marked that the patient was compelled to throw his head back in order to see (fig. 8). The right lid was operated on first and sufficient fascia lata was obtained for the other side. This fascia was preserved in alcohol and six weeks later the left lid was operated upon. The result obtained on the right side was excellent, while that on the left was a complete failure (fig. 9). About six months later the left lid was operated on, fresh fascia lata being used. No difficulty was encountered as the superior rectus was intact, but it was necessary to remove a small mass of scar tissue on the tarsus. The fascia lata had become absorbed probably as the result of its improper preser-

vation in alcohol. Figure 10 shows the excellent result two months after the second operation on the left lid.

Comments

Up to the present time five patients and nine lids have been operated upon. The results have been uniformly excellent, except in case 2, in which the first attempt on the left side was a failure. This failure can be attributed to changes in the fascia lata owing to its preservation in alcohol; for the second operation in which fresh fascia was used was successful. This case also demonstrates that in the event of a failure the operation can be repeated successfully with very little difficulty.

Due to the two-point attachment of the fascia lata, no tenting effect marred the result in any of the cases, a disfiguring complication occasionally encountered after the Motais procedure.

By using a strip of fascia lata of the length indicated, one has sufficient tissue so that there is no difficulty in obtaining firm anchorage of the fascia to the tarsus. This dispenses with one of the main objections to the Motais method. One need not deal with a small, thin, friable tendon, rather difficult to suture securely to the tarsus. Moremay be helpful to others in dealing with ptosis. By its further use it is possible over, the sutures will not cut through the fascia lata in the presence of a marked edema as they are apt to cut through tendon in the Motais operation.

Another advantage of this procedure is that the position of the lid may be made to conform with that of the other side, thus producing a more uniform and a better cosmetic result.

In reporting this procedure I realize that relatively few patients have been operated on by this method. The results, however, have been so uniformly successful that I have presented this preliminary report in the hope that it that advantageous modifications may be suggested.

Fig. 8 Fig. 9 Fig. 10

Fig. 8 (Dickey). Case 2, 20-months-old boy before operation.
Fig. 9 (Dickey). Case 2, two months after operation, showing failure on left side.
Fig. 10 (Dickey). Case 2, two months after second operation on left side.

Summary

This preliminary report presents an operative procedure for ptosis in which a fascia-lata sling is used, and which has the following advantages:

1. The technique is not difficult.
2. It can be used safely for young children.
3. In the event of failure the operation can be repeated easily.
4. There is no danger that sutures will tear out.
5. Due to the two-point suspension, no tenting effect has been encountered.
6. The operation permits an adjustment of the lid to conform with the other side.

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THE TREATMENT OF TRACHOMA

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This is a compilation of the material presented before the American Academy of Ophthalmology and Otolaryngology at Cincinnati, in September, 1935. It is an exhaustive, analytical report of the use of chaulmoogra oil in the treatment of trachoma. The complete paper has been scheduled to appear in the Illinois State Medical Journal. In its present form the paper was read before the Chicago Ophthalmological Society in December, 1935.

In the Governor Horner Trachoma Clinics in Southern Illinois, cases of trachoma are classified much according to the McCallum method under four types or stages based upon the appearance of the conjunctiva, namely:

Type I. Acute follicular or succulent or papillary or catarrhal.
Type II. Hypertrophic and hyperemic.
Type III. Beginning scar-tissue formation.
Type IV. Cicatricial.

In this paper, the cases will be referred to according to this classification.

Seventy percent of the uncomplicated **Type I** cases were of mild severity, while 30 percent had acute lacrimation, pain, photophobia, and blepharospasm. The uncomplicated cases of Type I upon the first visit to the Clinic were given a 1:5000 aqueous solution of oxycyanide of mercury to be used at home in an eyecup as an eyebath three times daily. For the first two weeks, no other treatment was used, but the patient was observed. Then treatment was instituted according to the severity of the case, as follows:

A. 1. Anesthesia with butyn. 2. Eversion of the lids with free exposure of transitional folds. 3. Massage of exposed conjunctivae with cotton-wound applicators saturated with chaulmoogra oil until the oil saponified as shown by a white foam. Special attention given to caruncle and fornices. 4. Copious irrigation with normal saline solution. This is continued until the follicles disappear and scar formation begins, when the frequency of the treatments is lessened and periods of rest are instituted. During all this time, the home use of oxycyanide is continued.

B. When papillary or follicular hypertrophy was present to a marked degree, grattage or expression was performed as early as feasible. Oxycyanide was given for home use and no clinic treatments instituted until the reaction had subsided entirely, a period lasting from four to eight weeks. Then chaulmoogra rubs were instituted, being given twice weekly until scar formation started.

C. In some cases, the quinine-bisulphate treatment of Selinger was used subsequent to grattage, instead of chaulmoogra rubs and oxycyanide.

There were 223 uncomplicated cases of Type I. Of these, 159 received chaulmoogra rubs alone, 5 grattage combined with chaulmoogra rubs, and 3 grattage and quinine bisulphate. In three to four weeks injection and tearing disappeared. The average case required about six months before the conjunctival condition became quiet. It did not seem to make much difference whether the case was treated according to method A, B, or C as regards the time required. But the end results were very satisfactory from two standpoints: first, the final appearance of the conjunctiva was smooth and there was a minimum of scar formation, thus reducing enormously the number of complications; and second, there seemed to be fewer exacerbations, once the condition was under control. There were exacerbations during the course of the treatment in only four cases, one following injury and the other three of unknown origin (1.8 percent). Five cases developed complications while under treatment, one a corneal ulcer and four a fresh thick pannus (2.2 percent).

There were 157 complicated cases of Type I, the complications consisting of bilateral pannus in 75 cases and in mon-

ocular pannus in 81 cases, corneal infiltrates in seven cases, corneal ulcer in six cases, and minor complications such as chalazion, pterygium, and dacryocystitis in eight others. As in the uncomplicated type, each patient was given oxycyanide for use at home. The complications were first dealt with, except pannus, which was untouched, and the treatment of the trachomatous conjunctiva was not started until the acuteness of the complicating factor had subsided. Then treatment was instituted along the same lines as in uncomplicated cases, with the addition that in six cases, zinc ionization was used experimentally. It may be added here that after a short period of experimentation, zinc ionization of the conjunctiva was abandoned because of the terrific pain produced, and the frequent development of corneal ulcers.

One hundred and twenty-one cases of this class were treated with chaulmoogra rubs alone, 30 with grattage and rubs, and 12 with quinine bisulphate. Compared with the uncomplicated cases, the time required to bring the disease to quiescence was longer by several months and it was noted that acute infections about the lids usually brought about an acute exacerbation of the conjunctival trachoma.

Type II. The number of cases under this type is small, 41 in all. Ten of these were uncomplicated and 31 complicated. Of the uncomplicated cases, four were treated with oxycyanide alone and the other six with chaulmoogra rubs and oxycyanide. Of the complications, 17 patients had a pannus in both eyes and eight pannus in one eye only. Eight had corneal scars. Twenty of the uncomplicated cases were treated with chaulmoogra rubs and oxycyanide, one with grattage and rubs, and two with quinine bisulphate. In general, the same observations pertained as in Type I.

Type III. There were 389 cases under this heading, practically all of them were of the complicated type. The complications were as follows:

Character	One Eye only	Both Eyes
Trichiasis and entropion	59	104
Entropion without trichiasis	2	12
Corneal scars	67	108
Pannus (fresh)	78	218
Corneal ulcer	12	10

Here as in the previous types, the primary treatment consisted in the home use of oxycyanide, and the earliest possible correction of the complication. The correcting measures were in the main surgical and the following operations were performed:

Procedure	Cases
Modified Ewing with canthoplasty	22
Modified Ewing without canthoplasty	8
Hotz with canthoplasty	4
Hotz without canthoplasty	34
Canthoplasty alone	5
Multiple cautery puncture for entropion of lower lid	12
Spencer Watson	5
Electrolysis of wild lashes	15
Gaillard suture	4
Removal of conjunctival calculi	9
Pterygium	11

The treatment which was undertaken after the surgical correction of complications consisted of grattage in 54 cases (occasional grattage first, next in the inner one third of the upper lid), chaulmoogra rubs in 315, quinine bisulphate in 6, simple glass-rod massage in 24, and zinc ionization in 3.

It is very difficult to place a time evaluation in this type of trachoma on account of the existing complications with their variable influence and because of the character of the patients. It is perfectly obvious that an indolent corneal ulcer, for example, will protract the healing process almost indefinitely, whereas the electrolytic removal of inverted lashes will result in a very prompt subsidence of the inflammatory condition. Again, the class of patients that come to these clinics expects continuous improvement in their subjective condition; consequently, when the trachoma becomes more or less quiet, they are apt to stay away from the clinics until driven there by an acute exacerbation or complication. But, in general, it may be said that when the

complicating factors are eliminated, the conjunctivae can be brought to a quiet condition by chaulmoogra rubs in addition to oxcycyanide, with a minimum of scarring.

Type IV. There were 324 cases under this heading which includes the quiet cases of trachoma with pale, scarred conjunctivae and small tarsi. The complications present were all old, as follows:

Character	One eye only	Both eyes
Trichiasis and entropion	88	55
Entropion without trichiasis	1	5
Corneal scars	49	88
Pannus	68	134

Treatment of the conjunctiva alone is practically negligible in this stage of the disease, oxycyanide being used if any irritation is present. At times, the patients complain of stiffness or dryness, in which case a mild massage with a glass rod is given. Surgical correction of the complications was carried out as follows:

Procedure	Cases
Hotz with canthoplasty	2
Hotz without canthoplasty	18
Modified Ewing with canthoplasty	20
Modified Ewing without canthoplasty	15
Spencer Watson	3
Pterygium	15
Cautery puncture of lower lids	18
Lip graft	3
Gaillard suture	7
Diathermy peritomy	7
Miscellaneous procedures	7

In 22 cases with corneal scars, the treatment consisted in the use of quinine bisulphate. In general, cases in this group remained quiet when irritating complications were permanently removed and no conjunctival treatment was needed.

It is of interest to note at this point that altogether there were only five cases of dacryocystitis (with constriction of the common duct), one in Group I, two in Gronp III, and two in Group IV. Only one tear sac has been removed, so far, on account of objections on the part of the patients.

Reduced to a more or less graphic form, the results of treatment by chaulmoogra rubs alone can be summarized as follows:

TYPE I.

Cases treated six months or less
- Still under treatment.....220
- *Under observation only..... 22

Cases treated six to twelve months
- Still under treatment 62
- Under observation only 4

Cases treated more than twelve months
- Still under treatment 25
- Under observation only 6

TYPE III.

Cases treated less than six months
- Still under treatment 64
- Under observation only 6

Cases treated six to twelve months
- Still under treatment 41
- Under observation only 7

Cases treated more than twelve months
- Still under treatment 42
- Under observation only 21

Summary

At the present time, there are 1,134 cases of trachoma under treatment or observation in the clinics, 380 in Group I, 41 in Group II, 389 in Group III, and 324 in Group IV. Nine hundred of these cases have been treated with chaulmoogra-oil massage and 1:5000 solution of oxycyanide of mercury together with such surgical correction of complications as was necessary. Of this total number, only 54 were resistent to such treatment. In general, it was found that from four to 12 months of such active treatment was necessary to bring an active trachoma to the quiescent stage, but the lack of scar tissue and the comparative freedom from complications justified the extra time required.

Of the 54 resistent cases 38 were

* By this phrase is meant that the disease is perfectly quiet and that the conjunctiva has a pale normal appearance. Many of the cases still under treatment show only some fine follicles persisting which are probably nontrachomatous, though not all regular.

treated with quinine bisulphate, under the direction of Dr. Selinger. In all but two cases, the acute symptoms subsided in two weeks, and the treatment was then continued from two months to a year. Three further cases remained in the subacute stage until other treatment was instituted. Two acute exacerbations occurred in the whole group while under treatment. Two patients developed dermatitis of the lids, which subsided when the treatment was reduced. Vision improved in thirty cases and, in general, the effect upon the involved cornea was favorable. By and large, the Selinger treatment with quinine bisulphate has proved efficacious in the management of trachoma, resulting in smooth conjunctivae with but little scarring and only few complications. The time required is about the same as that needed for the chaulmoogra treatment, possibly a little less.

Zinc ionization was used in one eye in 16 patients, while chaulmoogra rubs or quinine bisulphate was used as a control in the other eye. Insufficient time has elapsed to make a definite statement as to its efficacy; however, the treatment was so painful and the irritative effects so lasting that the majority of patients refused more than one treatment. In only one case was there a marked improvement, while in the others the disease was brought under control more speedily by the routine treatment.

58 East Washington Street.

SEVERE TUBERCULOSIS OF THE ANTERIOR SEGMENT OF THE EYE

Occurring in "parallel" pulmonary tuberculosis: treated by rest (Four cases)

E. V. L. BROWN
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The author gives the detailed findings in four cases of severe tuberculosis of the anterior segment which were unusual in that a severe lung tuberculosis was also present in each case and in that healing of the ocular tuberculosis apparently took place by rest treatment alone. There was final quiescence in all cases and restored useful vision in five of the six involved eyes, and this had been maintained for 6, 2½, and 3 years in the first three cases, respectively, and for eight months in the fourth case. Read before the St. Louis Ophthalmic Society, November 29, 1935.

Many ophthalmologists now accept the view that uveal tuberculosis is a bacteremia secondary to an active tuberculosis of the intrathoracic glands.

According to this view the ocular infection never occurs in the initial, lung-glandular stage, known as the "primary complex" of Ranke, but takes place in the second phase, which is characterized by exudation or by miliary dissemination. In the third stage, with lung destruction attending cavity formation, eye lesions, especially panophthalmitis, are rare.

Tuberculosis specialists everywhere recognize that the lung disease has a great tendency to spontaneous healing and that this healing can be greatly aided by rest. Ophthalmologists, too, recognize the great tendency of iris nodes and exudates to become absorbed and healing to take place. But for forty years the ophthalmologist has continued to rely upon tuberculin, an agent largely discredited by general tuberculosis specialists and never used by him to the exclusion of rest. And, too, the eye specialist has largely ignored what the tuberculosis specialist has done with rest. The eye doctor has been too content to see recovery from a given attack and has not given due consideration to recurrences, which may well indicate that the source in the chest is still active.[1]

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[1] Adapted from a previous paper, "The modern treatment of iridocyclitis tuberculosa." XIV. Concilium Ophthalmologicum, Madrid, Spain, April, 1933.

The tuberculous nature of the eye lesions in this small series of four cases is attested by the facts that (1) both irides were studded with tubercles in two of the cases and three finally showed v. Michel iris-atrophy flecks, characteristic of iritic tuberculosis, in each iris; (2) of the three patients with clinical pulmonary tuberculosis, one had had positive sputum, and tubercle bacilli were obtained from the surface of the tonsils in the second; in two of the patients the lung lesions were far advanced and in the third the lesion was serious for two years; (3) the two cases of extensive and severe keratitis with iritis had the characteristic capillary-glomerular ending of the new-formed vessels about deep corneal-stroma nodes. In one of these two cases there were positive X-ray findings of the lungs proper without clinical evidence of pulmonary tuberculosis.

Thus, three of these four cases are examples of the newly found "parallelism" of incidence and severity between lung and eye tuberculosis, while the fourth case, possibly though not probably, illustrates the older and still dominant theory of "antagonism" between lung and eye tuberculosis.

The cases should be of further interest because (1) the patient in case 1 has now had no eye lesions nor symptoms for six years and the lung condition is fair, though not all that could be wished. Weight, once 165 lb. and down to 107 lb. in 1929, up to 147 lb. nine months later, down to 105 lb. in July, 1934, is now back to 129 lb. In case 2 there have been no active eye nor lung lesions nor symptoms for 2½ years, while in case 3 no signs nor symptoms of the eye disease have been evident for 13 months and never any subjective lung symptoms. The objective X-ray lung findings have been of a serious nature and have not improved; indeed they are now rather more than less extensive than at any time during the 6½ years the patient has been under observation. In case 4 there have been only eight months of freedom from active eye inflammation, but at least 16 months of subjective and objective quiescence of the pulmonary lesions, which were minimal and fibrotic on X-ray examination.

Stated another way, there is here presented a group of four cases of severe tuberculosis of the anterior segment of the eye which are unusual because (1) severe lung tuberculosis was present in all four and (2) healing of the ocular tuberculosis has apparently taken place in all of the involved eyes by rest alone and there has been quiescence and restored useful vision in all four patients for 6, 2½, and 3 years, respectively, and for 8 months in the fourth case.

Each case has certain points of interest, briefly as follows:

Case 1. Bilateral nodular tuberculous iridocyclitis with bilateral fibrotic pulmonary tuberculosis.

Mrs. S., aged 42 years, mother of 6 children, was first seen in March, 1929. At the age of 38 she had weighed 165 lbs., at 41 she weighed 143, and on admission, aged 42 years, 107 lbs. When 26 years of age she had a year of lung trouble with cough, fever, and five weeks in bed. This trouble the doctor called inflammation of the covering of the right lung. Although our chest department did not believe that either this history, or the physical findings, or the X rays spoke unqualifiedly for tuberculosis, we eye doctors thought that the multiple nodes in each iris did so speak for tuberculosis, and the chest department was able to make a diagnosis of definite pulmonary tuberculosis three months later. Tubercle bacilli were found on the surface of the tonsils but never in the sputum, and when removed the tonsils showed no tuberculosis.

Two months in our hospital and three months in our sanitarium followed. Iris nodes were not definitely affected by the X-ray treatment, given early. No tuberculin was given. Mantoux and Wassermann tests were negative. However, after nine months of rest all nodes were gone. Many v. Michel flecks were then found in each iris and the eyes have now maintained this healing without recurrence for six years. (Vision is R. 0.6; L. 0.8; B. 1.2 with full use.) Not so with the lung tuberculosis. A small spontaneous pneumothorax occurred in October, 1934, and despite the fact that

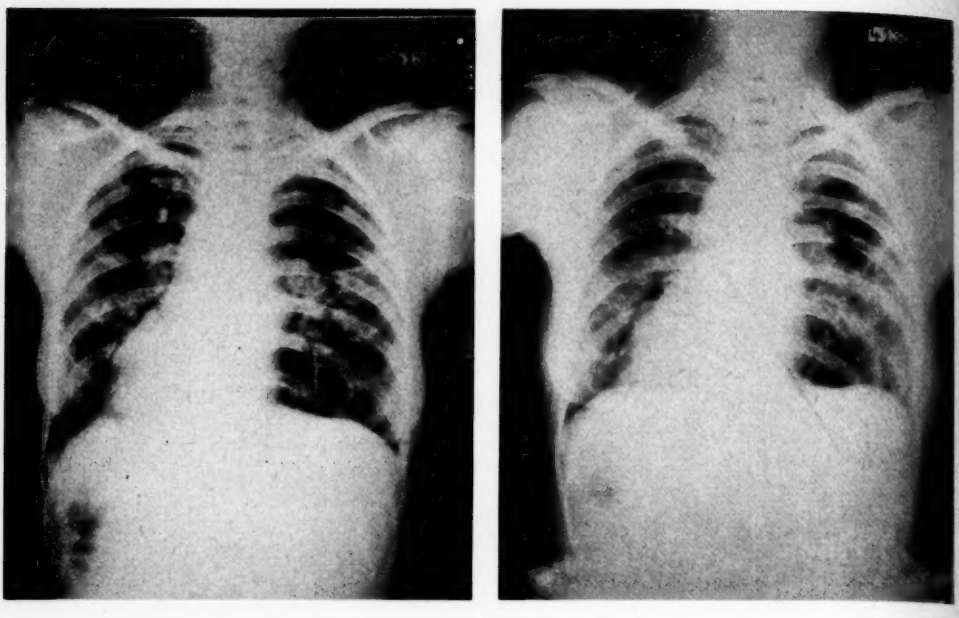


Fig. 1

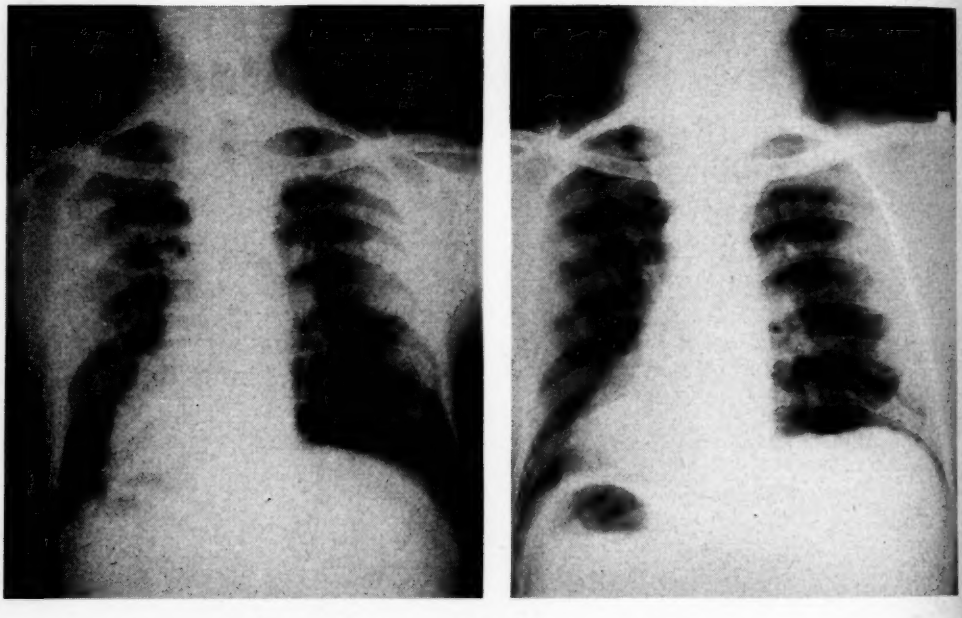


Fig. 2

Fig. 1 (Brown). Case 1. Left, fibrotic bilateral lesions as of February 17, 1933; right, no change on April 19, 1935.

Fig. 2 (Brown). Case 2. Left, widely disseminated tuberculosis, April 16, 1930; right, healing fibrotic tuberculosis, November 7, 1936.

the patient has had no subjective symptoms of any significance, aside from tiring, these six years, and that physical signs have not exceeded rales on coughing (scant sputum with no tubercle bacilli), the X-ray and fluoroscopic pictures have indicated very severe and serious recurrent extensions from tuberculous hilar glands into the adjoining lung tissue, with fibrosis increasing from time to time (fig. 1). Clinically, there was one long period of constantly decreasing weight (from 145 lb. in March, 1930, down to 105 in July, 1934), followed by a rise to 129 lb. at present (see weight chart). At present the patient is feeling well.

Comment: That the eye condition was tuberculous is indicated by the presence of nodes in each iris, at first, and by v. Michel flecks later.

That the lung condition was tuberculous is supported by X-ray and fluoroscopic findings, and clinically by the pneumothorax, despite negative sputum.

The iris nodes did not disappear under X-ray treatment but they did go away after a few months of rest treatment. No tuberculin treatment whatever was given. The nodes have not recurred in the six years intervening, despite severe exacerbations of the chest tuberculosis, noted clinically and by X ray, in the fourth and fifth years.

Case 2. Bilateral recurrent nodular tuberculous iridocyclitis, widely disseminated pulmonary tuberculosis.

W. N., aged 30 years, was first seen in June, 1929. Pulmonary tuberculosis had been diagnosed elsewhere, nine months before admission, on the basis of loss of weight, fever, and a slight cough. A probable but not definite tuberculosis of the apices was found by our chest specialists. Mantoux and Wassermann tests were negative. On sanitarium care the typical tuberculous nodes in each iris disappeared in three months and weight increased by 29 lb. to 147 lb. in six months. Yet in this sixth month X rays (fig. 2) showed a rapid bilateral extension of the chest lesions, exudative in character, with multiple small-cavity formation, though sputum was negative. The patient returned to the hospital and clinically the lung status was called "active," "cavernous," "proliferative," "far advanced." However, improvement followed, and after four months home rest was instituted and continued through 1931 and 1932. Weight was then up to 176 lbs. Rest periods at home have been continued these three further years to date and have brought the pulmonary tuberculosis to quiescence. Yet in the first of these five years there was a severe recurrence of the nodular iritis (March, 1931) requiring months of intensified rest. X-ray treatments induced only partial absorption of the nodes but with further rest in bed at home for nearly a year, after which modified rest was continued, no more nodes were to be found. Now, 2½ years later, there has been no further recurrence of eye trouble. Many v. Michel flecks are present in each iris. Vision is 8/10 and 6/10, with full use. Weight has stayed around 170 lb. X-ray and physical examinations show lung lesions which have been "quiescent for over six months."

Comment: That the eye condition was tuberculous is indicated by recurrent nodes in each iris followed by v. Michel flecks.

That the extremely severe lung condition was tuberculous is supported by positive sputum findings as well as other clinical, X-ray, and fluoroscopic findings.

There was no tuberculin treatment. The iris nodes (1) disappeared under rest treatment in the first attack (1929) and (2) only incompletely disappeared under X-ray treatment in the second attack (1931) but did so after months of further rest treatment.

Case 3. Unilateral nodular tuberculous kerato-iritis in clinically inocuous, though roentgenologically frankly miliary, pulmonary tuberculosis.

Mrs. E. G., aged 36 years, was first seen in May, 1929. The first attack of ocular inflammation had occurred 10 years before and had been associated with a loss of fifty pounds in weight. There had been a number of attacks of inflammation of the eyes in the last year. A severe, deep, nodular keratitis, with vessels twining about the nodes in

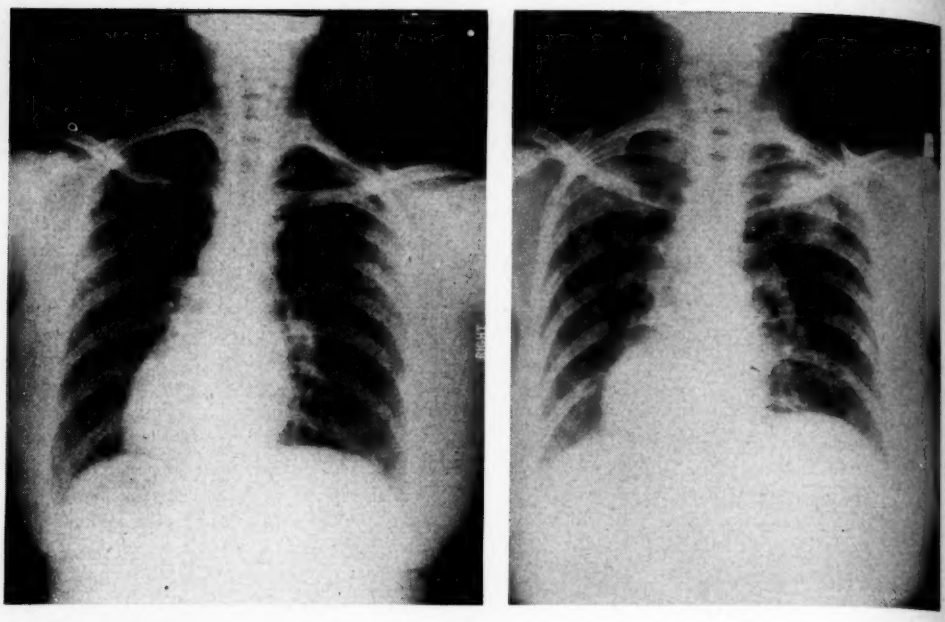


Fig. 3

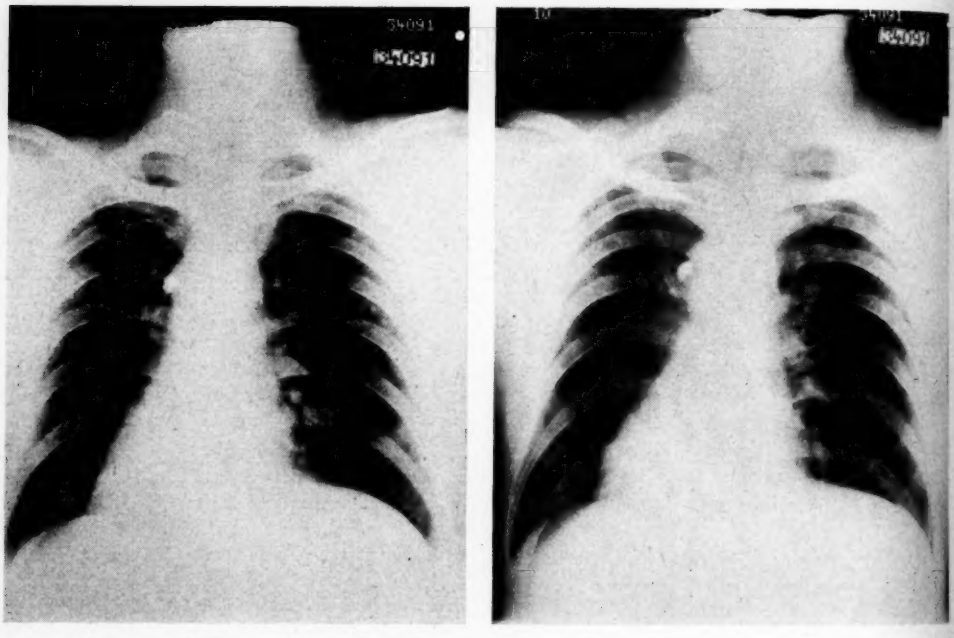


Fig. 4

Fig. 3 (Brown). Case 3. Left, frank miliary tuberculosis, May 22, 1929; right, bilateral apical infiltration with cavitation, November 4, 1935.

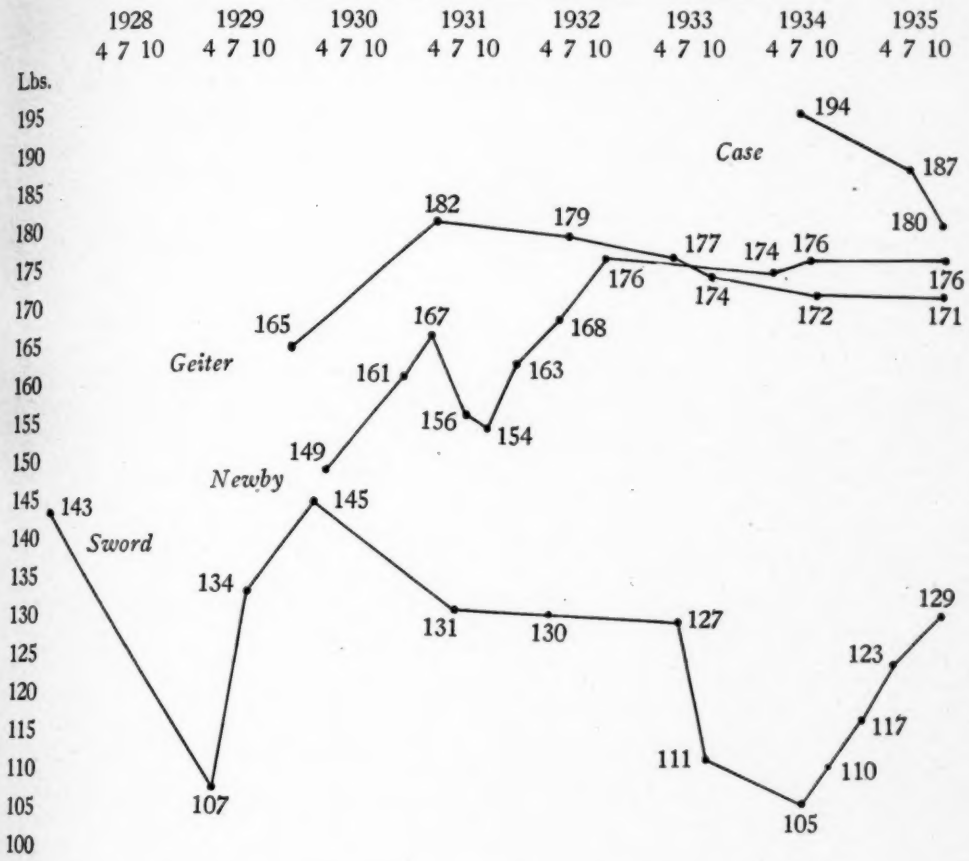
Fig. 4 (Brown). Case 4. Left, inactive minimal bilateral lesions, July 30, 1934; right, no change on November 5, 1935.

a manner unlike that in luetic keratitis, was found in the right eye. Mantoux and Wassermann tests were negative. Nearly three years of tuberculin treatment were of no avail but rest, instituted from the start, was associated with final healing and quiescence in the fourth, fifth, sixth, and seventh years.

The last examination (November 7, 1935) reads, "The patient has had absolutely no symptoms since the last visit, 13 months ago—no cough, no sputum, no fatigue; she does her own work, and this in house and yard, on porches, in the basement, and so forth (5-room bungalow). There are rales in each upper lobe—fine and crackling, on coughing. Chest X rays show no change in the 'very extensive dissemination which seemingly follows the bronchial tree.'" (See weight chart.) The phthisiologist adds "it is incredible that these lesions can cause no more disturbance than they do." The eye has now been quiet for three years, vision is 15/200 (L.V. 0.6), eyes in full use.

Chart 1

WEIGHT CHANGES IN EYE AND PULMONARY TUBERCULOSIS



Physical examination of the lungs has been essentially negative throughout these 6½ years of repeated study—many separate, intensive, careful examinations having been made by our phthisiologists. Yet from the first, the X ray (fig. 3) and fluoroscope showed an unquestionable, striking, central and later peripheral parenchymatous miliary or submiliary tuberculosis, indeed possibly some consolidation (1933).

Comment: That the eye condition

was tuberculous is indicated only by the corneal nodules invested by vessels in a glomerular arrangement.

That the lung condition was tuberculous is supported solely by the X-ray findings. Subjective and objective clinical findings, including sputum, were negative for tuberculosis.

Three years of rest and constant tuberculin treatment were of no avail. A fourth year of rest was attended by healing and quiescence, now of three years' duration.

Case 4. Bilateral nodular tuberculous kerato-iritis with inactive minimal bilateral tuberculous lung lesions.

H. J. C., aged 40 years, was first seen July 30, 1934, for "inflamed eyes," which trouble had begun nine months before. Serious, extensive, and severe, deep nodular corneal infiltration with rich vascularization and a discolored, superficially vascularized iris with v. Michel flecks was found in each eye at one time or another. Subcutaneous tuberculin and Wassermann tests were negative. No tuberculin treatment was given. Little or no improvement came for six months, though rest treatment was instituted at the start and faithfully maintained for nine months. Improvement began in the sixth month and continued three months, when the eyes became quiet.

Here there was a history of pulmonary tuberculosis, diagnosed elsewhere eight years before on the bases of anorexia, loss of weight, slight fever, night sweats, cough, no hemoptosis, but tubercle bacilli in the sputum for five months. This lung condition was relieved by four months in bed, but there was a recurrence the year following, again relieved by six weeks' bed rest, followed by six months of rest periods up to the end of 1929. The first serious eye trouble came four years later (1933) with failure of R.V. down to only differentiation of light from dark after six months, and in two months more complicated by a similar trouble in the other eye; the eye trouble then continued as a bilateral photophobia, lacrimation, and blurred vision for nine months, up to the time the patient was seen by us in July, 1934.

X rays (fig. 4) then showed "minimal bilateral tuberculous lesions"; clinically there was "minimal moderately advanced, questionably arrested, pulmonary tuberculosis, predominantly fibroid, bilateral." Rest treatment was begun a few weeks later and well followed out for nine months, when X-ray films showed the lesions to be "very definitely fibrotic." Clinically "the lungs are now (November, 1935) clear except for fine rales in one apex, increased on coughing. The pulmonary lesions are at least quiescent."

There has now been eight months of quiescence of ocular inflammation. From hand movements at the height of the inflammation in each eye the right vision has come up to 10/10 and left vision to 5/10, with the eyes in full use. Many v. Michel flecks are seen in each eye. However, the patient has lost seven pounds of weight in the past four months and must be watched (see weight chart).

Comment: That the eye condition was tuberculous is indicated by the nodular corneal infiltrations surrounded by meshes of fine vessels in one eye and v. Michel flecks in each eye.

That the lung condition was tuberculous is supported by the earlier finding of tubercle bacilli in the sputum, and other clear clinical fluoroscopic and X-ray data.

No tuberculin treatment was given.

Rest treatment appears to have been effective in bringing this recurrent severe bilateral kerato-iritis to eight months of quiescence, along with the recrudescent lung condition. But the patient has lost weight lately and a much longer time is needed before this lung and eye condition can be thought of as not likely to recur.

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SCIENTIFIC BASES FOR SELECTION OF BIFOCAL LENSES

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The distance correction worn by the presbyopic subject has a very important bearing upon the selection of the proper kind of bifocal lenses. A consideration of certain principles of lens action and their effect on the position of reading optical centers should guide in selecting the type and size of bifocal segments. Attention is given to vertical prism imbalance in the reading portion of bifocals caused by anisometropic distance corrections. Four methods of making compensation for this imbalance are discussed. Vertical prism imbalance at reading points induces artificial hyperphoria, and in order to insure comfort to the bifocal wearer it is necessary that this imbalance be taken into consideration and corrected in the lenses. From the Scientific Department of the N. P. Benson Optical Company, Inc.

Part I. The Selection of Type and Size of Bifocal Segments

There is no single bifocal on the market today that can be used successfully in all cases of presbyopia. Occupation and appearance are factors that must be taken into consideration in fitting bifocals. The distance correction worn by the presbyopic subject is of prime importance when making the proper selection of the kind of bifocal, as will be shown later.

Figure 1 demonstrates the optical properties of the Kryptok, Ultex, Orthogon "D," and the now obsolete cement bifocals. These bifocals are all of the large-segment variety. Figure 2 is typical of the small-segment types which are all fused bifocals, such as the Panoptik, Univis, Widesite, and Orthogon "C."

Looking at these rough sketches, we can derive a general idea of the fundamental optical properties of these different bifocals. Figure 1 (A) illustrates the fact that the base-up prism effect in the lower half of the convex distance lens has the tendency to be balanced by the base-down prism power introduced by the large segment. In figure 2 (A) the lens is concave and therefore has the prism base down in its lower half. The segment in the type of bifocal illustrated has the tendency to balance this base-down prism because it contains a base-up prism. Now we see that in figure 1 (B) and (C) and in figure 2 (B) the opposite is true; that is, the segment actually increases the prism introduced by the lower half of the body of the lens. In figure 1 (B) and (C), the segment increases the amount of prism, base down, in the concave lens. This causes trouble to the bifocal wearer by making all objects seen through the segment appear to jump from their normal positions. The reason for this is simple. When you look through a prism all objects are displaced *towards* the vertex of the prism or *away from* the base. In figure 2 (B) the segment adds more prism, base up, to that which is already in the convex lens, due to its inherent character. This again causes the wearer trouble by apparently displacing objects downward from their normal position. We shall now treat this question in more detail and at the same time provide a simple algebraic formula for finding just which type of segment is best for each case.

There are three optical centers that enter into the computations we are to make. They are as follows: (1) the optical center of the distance portion; (2) the optical center of the segment; (3) the optical center resulting from the combination of the distance portion of the lens and the segment. This last center is the one we are interested in determining because it is the place on the reading portion which should preferably be used for near vision. The location of this reading point can be determined by the following formula:

$$X = \frac{\text{Addition} \times S}{\text{Total reading power}}$$

in which X = distance the reading point is below the optical center of the distance field.

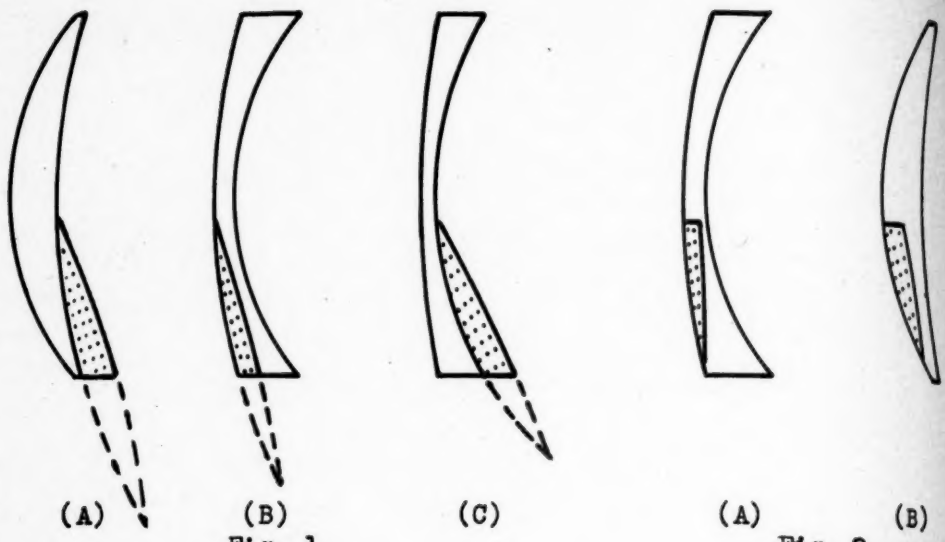


Fig. 1 Fig. 2

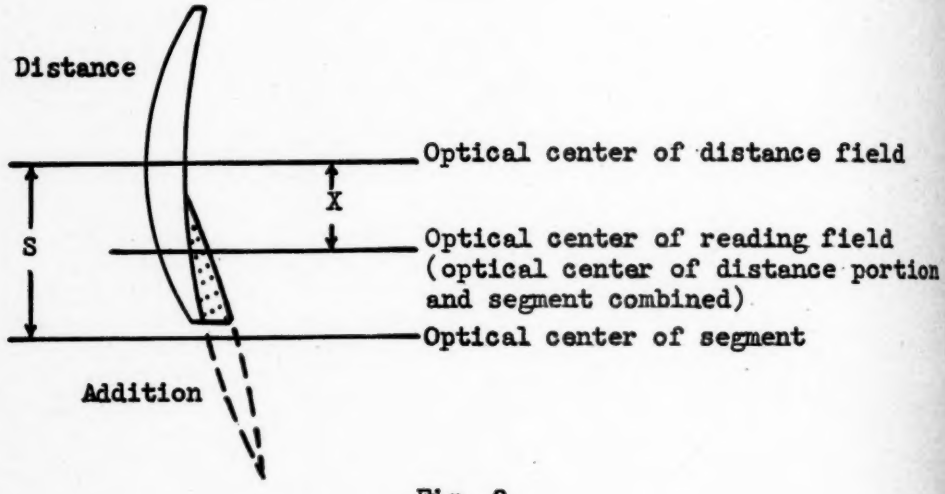


Fig. 3

Fig. 1 (Anderson). Optical properties of the large-segment variety of bifocal lenses.

Fig. 2 (Anderson). Optical properties of small-segment bifocal lenses.

Fig. 3 (Anderson). Three optical centers of a bifocal lens.

S = distance between the optical center of the segment and the center of the distance field. This will be made more clear by reference to figure 3.

Several sample calculations follow to show the application of the material covered thus far:

Example 1:

Rx +1.00 Add +2.00

Ultex "A" Upper border of seg. 2 mm. below optical center of distance field.

Patient reads at 7 mm. below distance center.

$$X = \frac{2 \times 21}{3} = 14 \text{ mm.} = \text{position of}$$

optical center of reading field below optical center of distance field.

Obviously the reading point at 14 mm. below the optical center of the distance portion is too low since we know that most people read at a point only 7 or 8 mm. below the distance center. If we do use this type of bifocal for this Rx, the patient will have a prismatic effect to contend with at the 7- or 8-mm. reading level, which produces an apparent jump as previously explained. The calculation for the amount of prism at this point is made from Prentice's Law which states that the prismatic effect obtained at any point on a lens has a power in prism diopters equal to the power in diopters of the lens in a given meridian multiplied by the distance in centimeters to the point considered from the optical center of the lens.

In the preceding example it was found that the optical center of the reading field is 14 mm. below the distance optical center. The point through which the patient reads, in this example, is midway between the distance and reading optical centers or 7 mm. from each. The power of the reading field being 3 diopters, the amount of prism at the 7-mm. reading level is found as follows:

$.7 \times 3 = 2.1^{\Delta}$ prism, base down

This large amount of prism base down indicates that a smaller segment should be used for this Rx. Example 2 will show why the smaller segment will work out better.

Example 2:

Rx +1.00 Add +2.00 (Same as in Example 1)

Orthogon "D" Seg. 2 mm. below center

$$X = \frac{2 \times 12}{3} = 8$$

The Orthogon "D" with its 20-mm. segment would, therefore, work out very much better for this Rx than the Ultex "A," because the optical center in the reading portion is 8 mm. below the optical center in the distance portion. The optical center of the reading field corresponds with the reading level

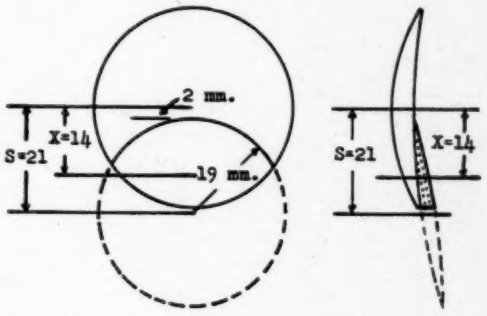


Fig. 4

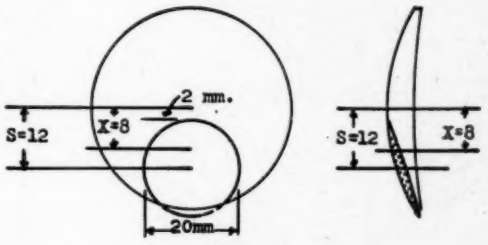


Fig. 5

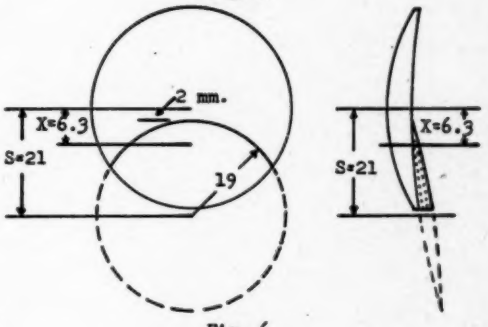


Fig. 6

Fig. 4 (Anderson). The positions of the three optical centers in Example 1.

Fig. 5 (Anderson). The positions of the three optical centers in Example 2.

Fig. 6 (Anderson). The positions of the three optical centers in Example 3.

so closely that there is practically no prism.

Example 3:

Rx +3.50 Add +1.50

Ultex "A"

Reading level 7 mm. below distance center

$$X = \frac{1.50 \times 21}{5.00} = 6.3 \text{ mm.}$$

This is a perfect prescription on which to use Ultex "A" because the resulting amount of prism at the customary reading level is negligible.

Suppose now that the reading level of a patient is 7 or 8 mm. below the optical center of the distance portion. (This is the usual location of the reading level, but variations are possible due to requirements peculiar to certain occupations or reading habits.) We will then wish to determine what kind of segment will be best. The following calculation will give us the desired information:

$$S = \frac{\text{Distance correction in } 90° \text{ meridian} \times X}{\text{addition}} + X$$

in which S and X represent the same values as defined previously and in figure 3.

Having found S, subtract from it the distance below the optical center of the distance portion that the top of the segment is to be placed, which in the sample calculation is 3 mm. This will give the radius of the segment most suited for that case.

Sample calculation follows:

Rx +1.00 D. Add +2.50 D.

Patient reads at 8 mm. below distance center.

$$S = \frac{1.00 \times 8}{2.50} + 8 = 11.2$$

Hence, 11.2 mm. is the distance from the center of the distance portion to the mechanical center of a segment that will work best in this case. If we make the segment 3 mm. below the distance center we have left 8.2 mm. (11.2 — 3 = 8.2). This would call for an Orthogon "C" bifocal with segment of 8 mm. radius or 16 mm. diameter.

The following general rules will aid in fitting a presbyopic eye with the correct size segment:

(1) Where distance power is plus and equal to the reading add (for example: +2.00 D. in 90° meridian with a +2.00 add), the ideal form of segment is one with a diameter of about 22 mm. Therefore, a Kryptok, Ultex "B," or Orthogon "D" would be preferable.

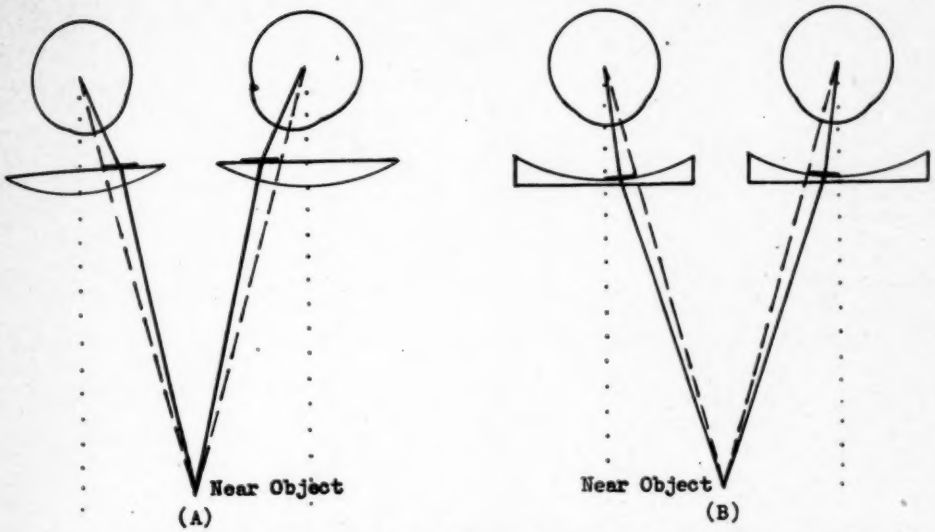
(2) If the distance correction is much stronger than the add (for example: +4.00 with +2.00 add) then the large segment of the Ultex "A" or "E" style is indicated.

(3) If the distance portion is a weaker plus power than the add or if it is a minus power, a small-segment bifocal such as Panoptik, Widesite, or Univis will work out best.

Inset of segment. Segment inset of 1½ mm. is usually considered the standard and correct amount. This amount of inset is seldom sufficient except in strong negative lenses. It is just as important to take into consideration the prismatic effect of the distance portion of the lens in determining the amount of inset as it is to measure the difference between the near and distant P.D. The distance at which near vision is to be used should also be taken into consideration (normally 16 inches).

When merely the difference between distance and near P.D. is used in determining the amount of inset, we are making our calculations as though the lenses were plano; that is, with no prismatic effect in them as we look away from the optical center. This, of course, is not correct because in a plus lens we have prismatic effect at the segment with the base of the prism facing the opposite direction of the inset. Contrariwise, in the minus lens, the prismatic effect at the segment is as though the prism had its base facing in the direction of the inset. Obviously then, since a prism causes an apparent displacement of the object toward the vertex of the prism, the bifocals with plus distance portions must have segments inset to a much greater degree than bifocals with minus distance correction. This will be made more clear by the diagram (fig. 7).

In figure 7 (A) the visual axis converges more than if no lenses were being worn. The reason for this is that the convex lens acts like a prism whose vertex is away from the center of the lens. This causes an apparent displace-



In these exaggerated diagrams broken lines show visual axis if no lenses were worn. Segments should be centered on solid lines as shown, not on dotted lines.

Fig. 7

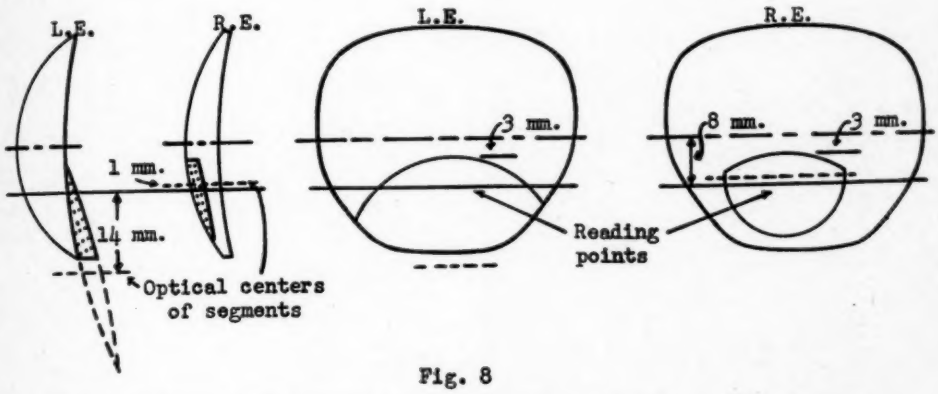


Fig. 8

Fig. 7(Anderson). Placement of segments on strong plus or minus lenses.
Fig. 8(Anderson). Combining dissimilar segments to correct prism imbalance.

ment of the object toward the apex of the prism (inner edge of the lens) and the eyes have to converge farther. The optical center of the segment should be placed in this line of vision as is shown in figure 7 (A).

In figure 7 (B) the opposite effect is found and shows why less inset of the segment is necessary to place the optical center of the segment on the correct visual axis.

On strong plus lenses (cataract lenses, for example) an inset of about 3½ mm. each will give the best results. On strong minus lens (about —10 or —12) just barely inset the segment to insure greatest comfort for the patient.

If there is any doubt as to the amount of inset needed in bifocals with plus distance corrections, always inset the *greater* amount to be on the safe side. On bifocals with negative distance portions, the opposite will be true, that is, inset the segment a lesser distance in case of doubt.

Part II. Method of Correcting Vertical Prism Imbalances in Reading Portions of Anisometropic Prescriptions

When a prescription is not the same for both eyes, a different prismatic effect is produced as the eyes rotate away from the optical centers of the lenses. Therefore, when the eyes are rotated downward from the optical centers, as in reading, a strain is created on the vertical muscles, producing artificial hyperphoria in varying degrees or actual diplopia, depending on the difference between the lenses. It is generally conceded that the patient can usually overcome, with comfort, up to one prism diopter of vertical imbalance at the reading points of the lenses. When the imbalance exceeds this limit, discomfort in near vision can be expected and some means of correcting the imbalance should always be employed.

There are four methods of correcting vertical imbalance at the reading points in bifocals, namely: 1. Grinding the prism in the lower portion only of one of the major lenses.* 2. Use of a different type of bifocal for each eye. 3. Univis "R" segments. 4. Vertical prism in segments necessitating special blanks.

In cases of this kind it is seldom possible to have the optical centers of the reading portions coincide with the reading points. It is important, however, to have the amount of prism at the reading points of the segments equal or nearly so.

Examples and illustrations of how the above methods are applied follow:

Example Method No. 1:

Advantages of this method are that the size and shape of the segments are alike for both eyes, giving the same size reading field and uniformity of appearance. A higher degree of imbalance can be corrected with this method than is possible with any of the others. Any type of fused bifocal can be used with this method of compensating, but the Univis is recommended because the straight top line of its segment falls right in line with the prism line ground in the major lens. Ultex can be used where only a sphere correction is involved.

The following example is an actual case from our files:

Rx. R.E. —3.75 D. sph. ⌯ —.50 D. cyl. ax. 180°
L.E. —1.00 D. sph. ⌯ —.25 D. cyl. ax. 110°
Add O.U. +1.00 D. sph.

Reading points are usually 7 or 8 mm. below distance optical centers. The 8-mm. position is used in this calculation.

When using this first method of compensation, the power of the segments does not enter into the calculation as long as they are equal.

The first step is to determine the power of the lenses in the vertical meridian which in the above Rx is:

R.E. —4.25 D. sph.
L.E. —1.00 D. sph. (actually 1.03 D.)

By using the Prentice Law,* the amount of prism in the vertical meridian at the 8-mm. reading points is found as follows:

R.E. .8 × —4.25 = 3.4$^{\Delta}$ base down
L.E. .8 × —1.00 = .8$^{\Delta}$ base down

Total imbalance = 2.6$^{\Delta}$ base down

It is, therefore, apparent that in order to eliminate the difference in prism power at the reading points, it is necessary to grind away 2.6$^{\Delta}$ of the 3.4$^{\Delta}$ base-down prism in the lower part of the right lens.

Example Method No. 2:

This method has the advantage of being less expensive than the other methods with the exception of the obsolete cement segments. The disadvantages are the dissimilar reading fields and the difference in appearance of the two lenses.

The amount of prism that can be corrected by this method is limited by the power of the addition.

The following example is an actual case taken from our files:

* Method number one also can be employed to good advantage on single-vision lenses.

* See Appendix B.

Rx: R.E. +.25 D. sph. ⌯ +1.00 D. cyl. ax 100°
L.E. +3.50 D. sph.
Add: O.U. +1.75 D. sph.

Reading points 8 mm. below distance optical center.

Tops of segments 3 mm. below distance optical center.

Transposing the R.E. in terms of spherical power in vertical meridian we have +.25. The +1.00 D. cyl. ax. 100° adds a negligible amount (see Appendix A). The power in the vertical meridian is:

R.E. +.25 L.E. +3.50

Difference in prism power 8 mm. below distance optical center equal

R.E. .8 × +.25 = .2Δ base up
L.E. .8 × +3.50 = 2.8Δ base up

Total imbalance = 2.6Δ

By applying the converse of Prentice's Law,* the distance above or below the reading point at which the optical center of the segment should be placed to bring about balance is found.

Thus with +1.75 D. sph. segments:

R.E. $\frac{.2^{\Delta}}{1.75}$ = .1 cm. or 1 mm. down

L.E. $\frac{2.8^{\Delta}}{1.75}$ = 1.6 cm. or 16 mm. down

The Panoptik, Widesite "A," or Univis "D" would fit the requirement of the R.E. closer than any other type. The Widesite "A" was chosen in this case because of its curving top and the price.

The optical center of the Widesite "A" segment is 4 mm. below the top of the segment and 1 mm. above the reading point. (See figure 8.) This segment, therefore, introduces (.1 × 1.75) or .175Δ base-up prism in the R.E. which reduces the vertical imbalance to 2.43Δ base-up (2.6Δ — .17Δ). This must all be corrected in the L.E. lens.

In the L.E. a segment whose optical center is 1.6 cm. down from the reading point is needed. The best that can be done is to use an Ultex "A" segment which has its top 5 mm. above the reading point and its optical center 14 mm. below the reading point. (See figure 8.)

The Ultex "A" creates

1.4 × 1.75 = 2.45Δ base down

The reading points are balanced, therefore, to within (2.45Δ — 2.43Δ) or .02Δ of each other.

Example Methods No. 1 and 2 combined

This prescription, involving a cataract lens, is one taken from our files.

R.E. +12.00 D. sph ⌯ +1.25 D. cyl. ax. 20°
L.E. +2.62 D. sph ⌯ +0.75 D. cyl. ax. 15°
Add O.U. +2.50 D. sph.

Reading point 8 mm. below distance optical center.

Tops of segments 3 mm. below distance optical center.

Transposing the R.E. to terms of vertical spherical power we get +13.10. The +1.25 D. cyl. axis 20° adds a vertical power of +1.10 to the +12.00 sph (see Appendix A). In the L.E. the +0.75 D. cyl. axis 15° is for all practical purposes equal to +.75 in the vertical meridian. The vertical power of the L.E. is therefore +3.37.

Difference in the vertical prism power at the 8-mm. reading point equals:

R.E. .8 × +13.10 = 10.48Δ base up
L.E. .8 × +3.37 = 2.69Δ base up

Total imbalance = 7.79Δ base up

It would be impracticable to correct this entire imbalance by method No. 1 because the strong prism required would create a disturbing amount of chromatic aberration. It is obviously impossible to correct the entire imbalance by method No. 2, hence it appears to be the best solution to use a combination of methods No. 1 and No. 2 (fig. 9).

The Ultex "A" gives the maximum amount of base-down prism in its segment and we, therefore, use it to neutralize part of the base-up prism at the right reading point. Since its optical center is 14 mm. below the reading point, it creates 1.4 × 2.50 = 3.50Δ, base

* See Appendix B.

down, at the reading point. This reduces the imbalance to 7.79Δ — 3.50Δ = 4.29Δ, base-up. The remaining imbalance must be compensated for in the L.E. This was done by using a Univis "D" segment and grinding a base-up prism on the lower part of the lens.

The Univis "D" segment has its optical center 2 mm. above the reading point. It, therefore, introduces .2 × 2.50 = .50Δ, base up, into the L.E., which further reduces the imbalance to 4.29Δ —.50Δ = 3.79Δ, base-up, in the R.E. A prism, base up, of 3.75Δ was ground in the lower part of the L.E. lens. The reading points were then balanced to within a few hundredths prism diopters.

Method No. 3

In slightly anisometropic cases the Univis "R" segment can be used successfully in the stronger additions. This method of compensation has some advantages over method No. 2 in that the segments are of equal size and shape. One segment, however, must be placed in an inverted position in order to create a prism action between the two segments. The maximum amount of vertical imbalance that it is possible to correct by this method depends entirely on the power of the addition, and if a flat top is to be retained on both segments the maximum amount of prism difference obtainable is about 2Δ.

Figure 10 shows the various segment shapes that it is possible to grind from "R" segment blanks.

(See table in Appendix D for amount of prism introduced by these shapes.

For further information on compensation by this method, see paper by

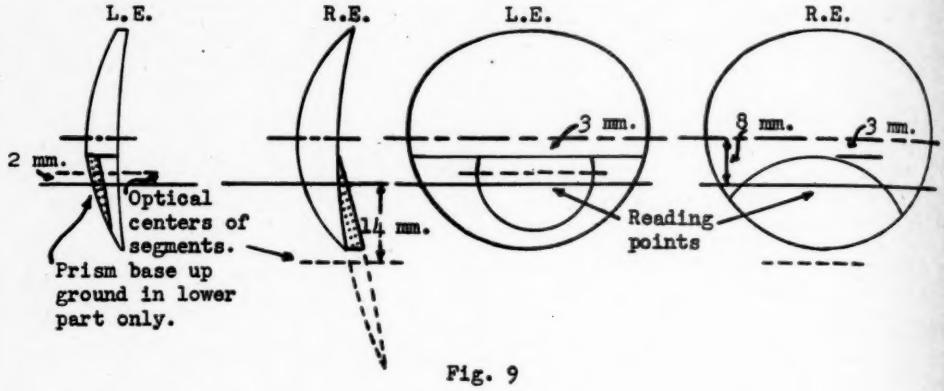


Fig. 9

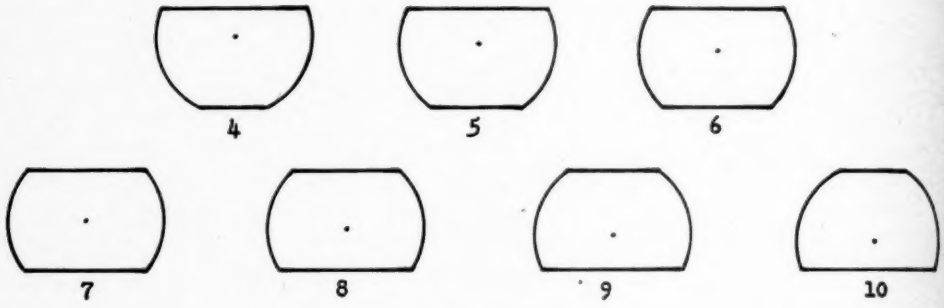


Fig. 10

Fig. 9 (Anderson). Combining Methods 1 and 2 to correct vertical imbalance at the reading points.

Fig. 10 (Anderson). Controlling position of optical center of segments by varying shape of "R" segment Univis.

Univis Company, "Univis Style 'R,' Its Properties and Uses.")

Method No. 4

The use of vertical prism in the segments has several disadvantages. Service is of necessity slower because special blanks have to be ordered from the manufacturer. The segments with vertical prism in them have shoulders that are not only very troublesome to the patient but also conspicuous. Lenses with this type of segment have to be ground much thicker than ordinarily to avoid grinding through to the thick edge of the segment.

Cement scales containing prisms also have heavy shoulders and are, in addition, open to all the objections of the ordinary cement bifocals.

The method of calculating the power of the prism necessary for vertical balance is the same as that for method No. 1. The amount of prism needed is usually divided evenly between the two segments, thus minimizing as much as possible the width of shoulder necessary.

Appendix A. Vertical power of oblique cylinders:

The table at the top of the next column, calculated from the square of the cosine law, will give the spherical equivalent at 90° of any oblique cylinder.

The figures in columns 2 and 4 are to be used as percentages when the cylinder is other than 1.0 D.

For example, find the vertical power of the following:

+2.00 D. sph. ⌯ +3.50 D. cyl. axis 55°

Look up 55° on the table. Opposite

1 Degrees from Axis	2 Value for 1.0 D.	3 Degrees from Axis	4 Value for 1.0 D.
0 180	1.0	45 135	.50
5 175	.99	50 130	.41
10 170	.97	55 125	.33
15 165	.93	60 120	.25
20 160	.88	65 115	.18
25 155	.82	70 110	.12
30 150	.75	75 105	.07
35 145	.67	80 100	.03
40 140	.59	85 95	.01
		90	.00

we find .33. Multiplying +3.50 by .33 we get +1.12 (to nearest one-eighth diopter) which is the vertical power of the +3.50 D. cyl. axis 55°. Adding 1.12 and 2.00 gives us +3.12, which is the vertical power of the combination.

Appendix B. Prentice's Law:

The prismatic effect at any point on a lens has a power in prism diopters equal to the power in diopters of the lens in the given meridian multiplied by the distance in centimeters from the optical center of the lens.

Converse of Prentice's Law:

The decentration necessary to produce any required number of prism diopters has a distance in centimeters equal to the required number of prism diopters divided by the power in diopters of the lens along the meridian in which the decentration is being made.

Appendix D. Prism introduced by the various-shaped Univis "R" segments with the following additions:

Shape No.	2.0 D. Addition		2.50 D. Addition		3.0 D. Addition	
	Reading Point 5 mm. Below Top of Seg.	7 mm. Below	5 mm. Below	7 mm. Below	5 mm. Below	7 mm. Below
4	.2° up	.6° up	.25° up	.75° up	.3° up	.9° up
5	no prism	.4° up	no prism	.5° up	no prism	.6° up
6	.2° down	.2° up	.25° down	.25° up	.3° down	.3° up
7	.4° down	no prism	.5° down	no prism	.6° down	no prism
8	.6° down	.2° down	.75° down	.25° down	.9° down	.3° down
9	.8° down	.4° down	1.0° down	.5° down	1.2° down	.6° down
10	1.0° down	.6° down	1.25° down	.75° down	1.5° down	.9° down

THE CONCENTRATION OF LYSOZYME IN THE TEARS IN ACUTE AND CHRONIC CONJUNCTIVITIS

With a note on the source of the lysozyme of tears

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The average lysozyme content of tears from normal eyes was markedly higher than the average content from tears of inflamed eyes. Pathological cases, however, often fall within normal limits as to concentration of the lysozyme in the tears. The authors find that the origin of the lysozyme is apparently the lacrimal glands rather than the mucous glands of the conjunctiva. From the Department of Ophthalmology, College of Physicians and Surgeons, Columbia University and the Institute of Ophthalmology of the Presbyterian Hospital.

Ridley[1,2] found that the lysozyme content of the tears was diminished in acute and chronic conjunctivitis, in keratitis, and in various conditions causing prolonged epiphora. He found that the administration of atropine increased the lysozyme concentration of the tears as it decreased the rate of tear secretion. Hallauer,[3] Cavka, and Prica,[4] and James[5] in general confirmed Ridley's findings.

Method of measurements of the lysozyme concentration in tears

After numerous preliminary experiments the following routine was adopted:—A flow of tears was stimulated by holding over the eye a wide-mouthed bottle containing recently crushed onions. The tears were drawn into a blood pipette of 0.02-c.c. capacity and mixed with 0.98 c.c. of saline in a small Wassermann tube. From this 1:50 dilution further progressive dilutions were made by transferring 0.7 c.c. of the mixture to 0.3 c.c. of saline, mixing, and again transferring 0.7 c.c. to 0.3 c.c. of saline. In this way a series of tubes was prepared containing 0.3 c.c. of tears diluted 1:50, 1:70, 1:102, 1:145, 1:208, 1:297, 1:416, and so forth. To each tube was added 0.3 c.c. of a suspension of air sarcinae, susceptible to lysis by lysozyme, previously standardized by comparison with a No.-8 barium-sulphate turbidity standard. The final dilutions of tears were thus doubled. The tubes were incubated for one hour at 37.5°C. The concentration of lysozyme was expressed by recording the highest dilution of the tears which completely dissolved the sarcinae.

When numerous tear samples from normal eyes were titrated in this manner the highest dilutions causing complete solution of the sarcinae were found to be from 1:140 to 1:416. Repeated tests on tears from the same individuals gave constant values during short periods of time but during longer intervals the titer varied between the above extremes. There was slight but inconclusive evidence that the lysozyme concentration had a tendency to be lower during periods of hot weather. In table 1 are shown the results of the titration of 73 samples of tears from normal eyes and of 63 samples from patients with acute or chronic conjunctivitis or with keratitis.

Fourteen percent of the tear samples from inflamed eyes had a lysozyme concentration lower than was found in any of the normal samples. Only one of the pathological samples contained a concentration of lysozyme equivalent to that of the highest normal group which included 30 percent of the normal samples. Between these two extremes there was a tendency for the normal tears to be concentrated in the higher groups while the pathological samples were more evenly distributed.

While the majority of the tear samples from inflamed eyes fell within normal limits, the average concentration in these was distinctly below that of the average normal sample. The average in acute-conjunctivitis cases seems to be lower than in the chronic cases.

The source of lysozyme in tears

The occurrence of lysozyme in tears has been confirmed by numerous workers, all of whom assumed that the en-

Table 1

Type of Case	Total Number in Each Group	Number and Percent of Tear Samples from Each Group Tabulated According to the Highest Dilution Causing Complete Lysis of 0.3 c.c. of Sarcinal Suspensions. Final Dilution of Tears									
		1:100		1:143		1:208		1:297		1:416	
Normal	73	0		12	16%	11	15%	28	38%	22	30%
Total Pathological	63	9	14%	19	30%	15	24%	19	30%	1	
Acute conjunctivitis	16	4	25%	6	37%	1		5	30%	0	
Chronic conjunctivitis	38	5	13%	9	24%	12	32%	12	32%	0	
Keratitis	9	0		4		2		2		1	

zyme was secreted by the lacrimal gland without, so far as we know, proving this to be the case. The action of lysozyme in splitting off reducing sugar from mucins reported elsewhere[6] suggested that the enzyme might be formed in the mucous glands of the conjunctiva. The decrease in the lysozyme content of the tears as a result of epiphora could then be explained by the dilution of the conjunctival secretions by the increased flow of tears.

The lacrimal glands and conjunctivae were removed from two anesthetized dogs, placed separately in acetone, and allowed to stand in the refrigerator. The dried tissues were weighed, ground and suspended in saline to make 1-percent suspensions of the dry weights. After standing 24 hours in the cold the suspensions were centrifuged and the clear supernatant fluid titrated for lysozyme content by a method essentially similar to that used for tears. Table 2 shows the comparative lysozyme contents of these tissues expressed as the highest dilution of the 1-percent extracts which caused complete lysis of the organisms.

Table 2

		Highest Dilution of Tissue Extract Causing Complete Lysis of Sarcinae
Dog. #1	Lacrimal gland	1:256
	Conjunctiva	1:2
Dog #2	Lacrimal gland	1:256
	Conjunctiva	1:8

Conclusions

The average lysozyme content of the tears from patients with acute or chronic conjunctivitis or keratitis is markedly lower than the average content of the tears from normal eyes. However, the concentration in many of the pathological cases falls within the limits found in the normal cases.

The lysozyme of the tears apparently originates in the lacrimal glands as is generally supposed, rather than in the mucous glands of the conjunctivae.

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ANISEIKONIA

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Aniseikonia, the condition of asymmetry in size and/or shape of the two visual images, has been studied in this series of 350 cases with the idea of determining the most frequent symptoms and the results of correcting such asymmetries with specially designed lenses. This report bears out the opinions expressed in two earlier papers on the same subject published last year in this Journal.

Aniseikonia is the condition of incongruity of the size or shape of the ocular images. Its existence under certain circumstances has long been known, particularly where the lens of one eye has been removed, or in cases of antimetropia, or of anisometropia of high degree. Until recently it has not been recognized that small inequalities of the images may be of extreme importance and that these asymmetries may exist when the refraction in each eye is the same and frequently when there is no refractive error in either eye.

Credit for bringing out these facts belongs to the exhaustive studies of the Department of Research in Physiological Optics of the Dartmouth Medical School, where excellent work has been done in devising methods of measuring small defects and designing lenses to correct the inequalities found.

When the higher amounts of aniseikonia exist, fusion of the two ocular images into one is impossible, and either suppression of one image or diplopia must exist. Image disparities of less than 5 percent may be fused, but with more or less difficulty, depending on the amount of asymmetry present. Many cases of definitely proved aniseikonia present no symptoms, just as many cases of other refractive errors, such as astigmatism, hyperopia, hyperphoria, and so forth, give the patient no discomfort.

There are, however, many patients who have severe symptoms. The most common ones, in the order found in our series of 350 cases, being:

1. Eye- and headaches. 2. Photophobia. 3. Indefinite ocular discomfort on use of the eyes, and the general asthenopic symptoms found in the more commonly recognized refractive errors.

When, upon using the eyes, ocular discomfort or headaches persist after the ordinary refractive errors have been corrected, aniseikonia should be suspected. Particularly, the presence of photophobia, not accounted for by diseased conditions, should make one suspect the presence of this particular defect. Many, if not most, patients who find comfort in tinted lenses have aniseikonia as the cause of their discomfort. It has been found that the correction of the aniseikonia relieves the photophobia and that tinted lenses are very rarely necessary.

One type of headache in which the correction of aniseikonia has been unusually effective is the unilateral, frequently recurring, and often prostrating headache, usually coming on without definite relation to use of the eyes and often accompanied by nausea and photophobia, the latter not particularly limited to the time of the attack. This is often diagnosed as migraine. In few of the cases in which patients have been helped has there been any premonitory aura. An exemplary case report follows:

Dr. L. F. gave a history of very severe prostrating headaches, recurring at frequent intervals, the attacks usually lasting two or three days. The examination of the eyes showed considerable hyperopic astigmatism, the prescription being:

R.E. $+4.50$ D.sph. $\bigcirc\!\!\!\!\bigcirc +1.75$ D. cyl. ax. 75° $= 20/15$

L.E. $+2.50$ D.sph. $\bigcirc\!\!\!\!\bigcirc +2.25$ D. cyl. ax. 108° $= 20/15$

In addition, there was a right hyperphoria of 1.25^{Δ}. Inasmuch as at the examination no great change was found in the refractive correction from that which he had been wearing, it was suggested that the relative size of the visual images be measured. Examination on the ophthalmo-eikonometer showed the right image to be 0.75 percent smaller in the vertical meridian than the left image, and the left image to be 0.75 percent smaller horizontally than the right image. Iseikonic lenses were prescribed to correct this inequality of the visual images, and since

wearing the lenses (eight months) he has had no headaches and is able to go about his practice with comfort.

On the suggested possibility of aniseikonia's being a factor in the production of true migraine, a special series of 28 cases was examined in coöperation with Dr. O'Sullivan of the migraine clinic at Bellevue Hospital, New York. Aniseikonia was found in only a small portion, in fact two of the cases occurred in one-eyed individuals. Aniseikonia was present no more frequently in these patients than in any other group chosen at random.

The relation of aniseikonia to various phorias and tropias has not as yet been definitely ascertained, but it is a fact that patients who present aniseikonia very frequently have low degrees of phoria. It has been observed in some cases presenting hyperphoria, that this has diminished or completely disappeared on the correction of the aniseikonia. Experience indicates that prisms are very rarely necessary when aniseikonia is present and properly corrected. It has also been found that most cases of strabismus in which the size of the images can be compared, have presented quite a high degree of inequality of the visual images. If the difference is greater than 5 percent, the images cannot be fused. This asymmetry of the images is a cause of the persistent diplopia occasionally occurring after squint operations, the so-called "horror fusionis."

This was graphically demonstrated in the case reported by Professor Bielschowsky early this year.[1] By means of the correction of a disparity of about 13 percent in the size of the images, the diplopia immediately disappeared not only in the primary position but throughout almost the entire field of fixation. Excellent depth perception was proved by measurement with the Keystone Stereometric cards. On removal of the lenses cyclotorsional as well as horizontal and some vertical diplopia was present. A most surprising phenomenon was that binocular single vision was maintained not only in the central portion but throughout the entire field of binocular fixation. A plotting of the diplopia in this case was published in an article by Dr. J. M. Wheeler in this Journal (1935, v. 18, Jan., p. 1).

Method of measurement. The apparatus has been fully described in the publications of the Dartmouth group[2] and illustrated in a previous article by the author.[3] Lenses for the correction of aniseikonia must be very carefully calculated from tables (specially prepared by the Department of Research in Physiological Optics at Dartmouth College) as to their curvatures and thickness, and be very carefully ground to produce the desired result. Frequently a double lens must be designed. This may be of the double-eyewire or temporary type, or the lenses may be designed, as in the so-called permanent type, to fit in one eyewire.

In general, for plus power lenses the more highly curved the inside surface is ground and the thicker the lens is, the greater the magnification produced. The following table[4] shows the curvature and thickness of zero-power lenses necessary to obtain magnification of various amounts up to 5 percent, effective for light coming from a 20′ distance:

Magnification percent	Inside Curvature diopters	Thickness mm.
1.00	—7.50	2.03
2.00	—9.50	3.22
3.00	—11.50	3.98
4.00	—13.50	4.52
5.00	—15.50	4.91

Still more magnification and meridional differences in magnifications can be obtained by combinations making up telescopic systems to give the necessary spherical, cylindrical, and iseikonic corrections.

Results. The results here recorded are limited to the first 250 patients examined. This is done to exclude the ones for whom lenses have only recently been prescribed and those who have not had their lenses a sufficient length of time to permit definite determination of results. Practically all of these patients were referred by ophthalmologists because they were suspected of having aniseikonia.

Up to the present 357 cases have been

examined. Aniseikonia was found in 235 or 65.8 percent. In 191 cases the patient obtained iseikonic lenses and was rechecked after wearing the first or temporary pair for varying lengths of time, usually at least three weeks before the permanent prescription was given. The findings were then rechecked. All patients included in the group have had their lenses over four months with the following results:

Eighty-nine or 46.6 percent obtained complete relief. Fifty or 26.2 percent obtained marked, though not complete relief. Five or 2.7 percent obtained only slight relief from the temporary glasses, usually insufficient to warrant having the more expensive single-eyewire type made up. Forty-seven or 24.5 percent obtained no relief.

Discussion. A means of helping approximately 75 percent of the difficult refraction cases in which symptoms were not relieved by the ordinary refractive methods has been applied clinically in this series of cases.

Drawbacks. Certain disadvantages in the procedure must be taken into consideration:

1. Length of time required for the examination and occasional uncertainty of the results. 2. Cost of the instruments to the examiner. 3. Expense to the patient, owing to the lengthy examination and the cost of the specially designed glasses.

Despite these drawbacks, however, if relief of the distressing symptoms of even the majority of this difficult class of patients, who have usually been examined many times without relief, can be obtained in this manner, our efforts have not been in vain.

New light has been thrown on many heretofore poorly understood phenomena, but a great deal more work will need to be done for their further elucidation. We know, for instance, that by correction of aniseikonia many cases of photophobia and hyperphoria are relieved without the use of tinted lenses or prisms. A new chapter is being written; how many of our present perplexities will be solved we do not know. The indispensable requisite, however, is an open mind, alert to interpret and apply the new knowledge where it will do the most good.

Full credit for the development of this work must be given to the Department of Research in Physiological Optics at Dartmouth Medical School. I am indebted to Prof. Webb W. Weeks of the New York University and the New York Eye and Ear Infirmary in whose department this work was done; also, to Mr. A. Haustetter who so graciously loaned the apparatus, and particularly to H. M. Fisher, O.D., who has so well conducted the majority of these exhaustive examinations. The cooperation of various ophthalmologists of the district is also gratefully acknowledged.

Professional Building.

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NOTES, CASES, INSTRUMENTS

THE RECESSION OPERATION

Reply to a criticism

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The open discussion of current procedures in meetings and standard medical journals is one of the fortunate practices of our profession. By it the chaff is winnowed from the grain and the final worth of methods and procedures ultimately emerges.

It is thus that I welcome the article of Dr. Roderic O'Connor—"The recession operation, a criticism"—in the December, 1935, number of the American Journal of Ophthalmology.

It conveys to me, and must to many others who have for years experienced success in practicing the entity of recession, what seems to be a very real lack of knowledge of the operation and the entity and a lack of understanding of the problem involved, and I am glad of the opportunity of correcting what I believe to be the erroneous conclusions arrived at in the article.

I will answer the criticisms in the order in which they are presented, but would, however, first say in general that I regard and have always emphasized the procedure of recession as an entity rather than the technique of an operation alone for the following reasons:

In 1922 I published the findings of some five years' work which had for its object to impart to the side which had previously been tenotomized without safeguards, the requisites of definite scleral fixation, definite gradation, and broad definite insertion. This paper reported the first 50 cases of single recession ever performed under these accurate safeguards. The single operation had to be performed, for had advancement been done at the same time it would have been impossible to determine capability and effect of the recession alone.

A parallel study of single advancement was then instituted. These two studies taught, among other things:

1st. That while active highly energized muscles, that is, convergent, were more sensitive to surgical interference than the passive muscles, operation upon them furnished much the larger contribution of correction.

2d. That having previously only one side (advancement) upon which we could accurately grade and compute effect, much more accurately graded and computed effects were obtainable now that these requisites could be employed on both the recessed and advanced sides.

3d. That recession in the hypertense, highly muscularized, and highly innervated types furnished by far the largest contribution of correction, and in a large proportion of cases of this type recession was the only procedure necessary.

4th. That advancement or shortening, when not opposed by high muscularization, tension, or innervation, gave a high return of correction, and in most instances of this type was, as a general rule, the only procedure necessary.

5th. That a combined procedure unnecessarily performed sometimes defeated the effect of both recession and advancement.

6th. That when computation pointed to a division or combination of recession and advancement, an equitable proportion in the average case was 1 mm. of recession to 2 mm. of advancement.

7th. That to correct a deviation best a muscle, either advanced or recessed, should be placed definitely, and secured definitely and broadly at a point on the sclera indicated for the individual requirements of the case.

8th. And, finally, that preoperative computation, having the guidance of distinct rules, could with a fair degree of accuracy indicate

the amount of recession or advancement required and the type of operation which should be used or emphasized.

Thus, by these findings, recession entered a wider field as an entity with a definite relation to muscle work at large instead of being only an operation, the technique of which it was alone necessary to master.

Hence the procedure which Dr. O'Connor criticizes includes:

> Definitely graded, sclerally fixed, and broadly attached tenotomy or advancement.
> Definite and careful preoperative computation as to the type of muscle or fascial conditions which exist at the time of operation after exposure, and the amount of gradation necessary.
> The adaptation of the best type of operative procedure to the existing muscle or fascial abnormality, and also the determination as to where the emphasis of correction should be placed or primarily placed.

I will now reply to Dr. O'Connor categorically, commencing with four general statements:

1. Criticism—page 1137, col. 1, line 8:

"A patient is entitled to the safest operative work that will give the desired result."

Answer.

This contention must seem so obvious as to need no discussion, and that I believe recession to be the procedure of utmost safety if conservatively and properly used (and no procedure is safe if improperly used) will I think be seen in the following pages.

2. Criticism—page 1137, col. 1, line 10:

"Muscle surgery is in the category of those procedures that do not warrant the taking of unnecessary risks as to either muscle action or the globe itself."

Answer.

The recession operation is probably the one of all muscle operations which preserves muscle action to the greatest extent by virtue of careful computation, accurate gradation, and broad scleral fixation; and there is no risk to the globe if properly performed nor to the muscle if conservatively performed.

3. Criticism—page 1137, col. 1, line 14:

"The recession operation is risky in two respects: (a) Muscular mechanics and functions are unduly altered. (b) Scleral sutures have caused the loss of an eye itself."

Answer.

A. I would refute this entirely. Neither mechanics nor functions are unduly altered but duly altered and protected to a greater extent than would be performed by a tenotomy.

B. In isolated instances all muscle operations, advancements, and tenotomies without suture have resulted in the loss of an eye. Scleral suturing has long demonstrated itself as being as safe as any procedure.

4. Criticism—page 1137, col. 1, line 18:

"Operative methods are available that secure the desired results without these risks."

Answer.

Anyone who has familiarized himself with the recession procedure, will, I believe, testify to its safety as compared with any other procedure. It is probably the least reactive of modern procedures that are practiced in muscle work.

Dr. O'Connor next objects to the three following opinions which he states have been expressed by me.

1. That I have said—page 1137, col. 1, line 32:

"That a re-set to the equator is permissible. (This means about 6 mm.)"

Answer.

I would reiterate this statement I made and would say again that a "re-set" to the equator is not only permissible but sometimes absolutely necessary in certain hypertensive types. I will go further than this and state that in some instances, that is, the fascial syn-

drome and strabismus fixus types, it is necessary frequently to recede behind the equator. In the large tense congenital types, recession to the equator is, as a rule, necessary if any correction is to be obtained.

2. That I have said—page 1137, col. 1, line 36:

"That extensive lateral capsular cuts are necessary to permit the tendon to drop back as far as that."

Answer.

Diverging lateral incisions in the capsule are necessary in any of the advancement or shortening procedures, and they make for the best and smoothest adjustment. Why should they be a crime in recession? In many cases they are not extensive; the lateral incisions should extend only to the point to which the muscle is recessed. After a properly performed recession there are no "lateral cuts" behind the sclerally fixed muscle.

Dr. O'Connor's next remarks to the above statement (no. 2.) with regard to lateral cuts—page 1137, col. 1, line 39:

"This to my mind is an indirect way of stating that an ordinary complete tenotomy does not give enough setback."

Answer.

He is mistaken in this premise. An ordinary complete subcapsular tenotomy may, if tensive muscle exists, give too much setback. An ungraded, unsecured subcapsular tenotomy may, after it is released, be pulled back behind the equator to form an indefinite fascial or globular attachment. Dr. Eugene Blake and Dr. F. Carroll in their study of repair following tenotomy and recession state:

"In some instances there was fairly firm union after simple tenotomy within a few days, while in other cases, even after a much longer period of time, the attachments were feeble and broke away when moderate traction was applied. In two cases no reattachment of the tendon took place. On the contrary, when the Jameson operation of recession was done, there was firm attachment in every instance, and the tendon applied itself to the point where sutures were placed" (Trans. Amer. Ophth. Soc., 1932).

3. That I have said—page 1137, col. 1, line 44:

"That scleral sutures are safe and can be properly placed in all cases. (When one recalls that the sclera is only four- to five-tenths of a millimeter thick at the equator—and this in adults—it becomes evident that a great deal of skill would be required to split it with 100-percent consistency. The thinness of the sclera in children calls for even greater accuracy.)"

Answer.

Dr. O'Connor evidently has not acquired nor is he familiar with the technique of scleral suturing in the region of the equator. He cites the familiar academic objection of almost every operator who has never practiced it. It requires some skill as does any new technique but once mastered it becomes the easiest, simplest, and safest of operations. In every instance when the technique is faithfully followed it will demonstrate its safety to be equal to any other operative procedure involving muscle work. Its greatest objectors have often become its greatest devotees.

4. That I have said—page 1137, col. 2, line 6:

"That catgut-suture material is . . . 100 percent safe . . ."

Answer.

This statement I never made. The catgut which I use (Davis and Geck) is 100 percent sterile. No suture is 100 percent safe, but what I did say was that the joy of muscle surgery was not experienced until one used catgut sutures, and that they were less irritant, less strangulative, and held as well as silk, and did not require removal.

With regard to suturing Dr. O'Connor further remarks (referring to my ligated suture)—page 1137, col. 2, line 8:

"Two ligated sutures, if I interpret his drawing correctly, leave eight square knots of catgut buried. This

leaves a rather large amount of catgut to be digested and absorbed."

Answer.

Again my critic is astray. His statement and interpretation are contrary to fact. In neither operation, recession or advancement, which I perform, is suture or knot of catgut buried. In every instance the knots are brought between the lips of the primary wound and, if tied in mass, stand out like pillars, showing that the ligation holds. Only one strand in each ligation disintegrates and the suture is then released. This happens with great regularity between the eighth and tenth day. In no instance are they buried.

Criticism—page 1137, col. 2, line 17:

"Absorption is especially slow in this region, as I learned when using catgut in my cinch operation, in which there are no knots and in which therefore a much smaller amount of catgut was employed. Frequently even triple 0 chromic had to be removed because of irritation and failure of absorption."

Answer.

Davis and Geck who supply 10 million tubes of catgut yearly, and who have investigated every possible channel, testify that catgut is only slow in absorption where nonvascularization and dryness occur. In the region in which we use it neither of these conditions pertains, and it disintegrates without irritation on schedule time. Strangely, I have not encountered any of the difficulties which Dr. O'Connor mentions. Is it not just possible that he mistook a necrotic strand of his tendon for catgut, a coincidence which might occur from such a highly strangulative and highly reactive procedure as the O'Connor cinch?

Criticism—page 1137, col. 2, line 34:

"To me it seems evident that if a muscle works best with its insertion six millimeters from the cornea, it cannot do so with one 12 millimeters back—at the equator."

Answer.

The value of this criticism may be judged by the reasoning. It is true that in the normal eye a muscle works best from its normal insertion; but these strabismic deviations are not normal and act too vigorously from the normal insertion, so that Dr. O'Connor has to put it back toward the equator with his two-stage tenotomy. In the hypertense types his muscle insertion, if correction is to be obtained, frequently reaches the equator, and in some instances it would be a matter of luck if it does not go farther. In the instance of recession it is put back by the process as described, secured, sclerally fixed, graded, and broadly attached. The difference between these two procedures is that the one (tenotomy, Dr. O'Connor's) has no definite gradation, has no definite scleral fixation, no security against indefinite attachment. The difference also is that the recessionist knows where his muscle is placed. Dr. O'Connor, after performing his tenotomy non-exposed and in the dark, is in semi-ignorance of where his muscle end finally reaches.

Criticism—page 1137, col. 2, line 38:

"Dr. W. had a simple tenotomy of his left internus done in 1921, for an esophoria of 10 degrees. In 1932, the left externus was tucked. In February, 1933, the right internus was 'recessed 3 mm.' When he came to me he was wearing a pair of 6-degree prisms to prevent diplopia, and his esophoria was 22 degrees. In spite of this he could converge only to 6 inches. Inward rotation of the right eye (recession) was only 25 degrees while that of the left (tenotomy) was 45 degrees. I shortened the right externus by the cinch method, securing lateral orthophoria. In as much as he was an emmetrope the freedom from his heavy prisms was a 'joy,' and he became a most happy patient after 13 years of 'misery.' His case affords a wonderful opportunity to compare the results from four different types of operation. It should be noted that a 3-mm. recession caused more interference with function than the simple complete tenotomy. I am confident that I could have secured the desired result with cinch shortenings and central tenotomies with no loss of convergence or of inward rotation."

Answer.

The recitation of a case of this kind without adequate history to prove anything, borders on the ridiculous. There is virtually no history of the findings prior to the time of operation, only meager statement that the patient had an esophoria of 10 degrees. No statement of the primary near point of convergence, no test for muscle excess or insufficiency, no test for prism measurement for near and distance, and no tests for duction or excursion. No computation or study of the actual and exposed anatomy of the part is mentioned, nor diagnosis of existing type. The citation of the operations done, therefore, does in no manner "afford a wonderful opportunity to compare the results from four different types of operation." The charitable way to look at the end result of a case of this kind with no preliminary examination or diagnosis of existing conditions, is that it was operative misjudgment from the start. The laudation of the O'Connor cinch procedure falls down completely when it is taken into account that the different types of procedure practiced may have contributed to the end results, which, according to the history, was far from being perfect, as also the note that a 3-mm. recession done on the left side caused more interference of function than a simple complete tenotomy on the right. In the absence of definite information as to where the tenotomized muscle end eventually landed on the tenotomized side, no fair comparison can be made. It is against common sense to argue that an insecure, unguarded, nonsclerally fixed tenotomy with indefinite attachment holds better than an operation in which requisites are applied as in recession. Moreover, the fact cited, that a tenotomy with a superimposed tensive tuck operation gave the left eye more rotation than was obtained for the right with a 3-mm. secured recession, has not a sound logical ring. If it was primarily a case of underlying convergence insufficiency, which it probably was, a recession or tenotomy should never have been performed. If it was a convergence excess (hypertension case) a 3-mm. recession would never cause a limitation of 25 degrees in rotation. If it was a convergence insufficiency underlying esophoria, it would have been best corrected by a bilateral resection, or tuck on the external side, or one of the other excellent procedures without either a two-stage tenotomy or a recession.

Criticism—page 1138, col. 1, line 22:

"It has been generally accepted that an increase in the contact arc will increase the leverage to rotate the eye. If this is true, can it not be assumed that a decrease in this arc (recession) will have the opposite effect?"

Answer.

It depends upon the degree of deviation and the amount of recession. With the high degrees it is not necessary to assume what is a fact.

Criticism—page 1138, col. 1, line 27:

"An insertion set at the equator has no contact arc whatever."

Answer.

Neither has an eye any contact arc which has a high internal deviation which requires that it be set back to the equator.

Criticism—page 1138, col. 1, line 29:

"An internus so set on rotating the eye reaches a straight-line pull from origin to the new insertion before the normal limit of inward rotation is reached. The closer this line of pull approaches 'the shortest distance between two points' (straight pull) the less is its leverage for rotating . . ."

Answer.

The object of either a tenotomy or a recession in any form is to lessen the excess of internal rotation. This is what Dr. O'Connor's two-stage tenotomy aims at. It is the only manner by which a deviation can be corrected if advancement or shortening fails.

Criticism—page 1138, col. 1, line 37:

". . . and it cannot go beyond that line."

Answer.

No, but what Dr. O'Connor omits is the fact that it can contract a long way

within the line, if high muscularization and innervation exist. Anyone who has exposed his field of operation (as nearly always should be done) and witnessed the giantlike structure of a congenital hypertrophied muscle, which one of my associates, Dr. Willard Reynolds, on demonstration, stated resembled more a "gluteal muscle" than an ocular muscle, and any one who has tested its tenseness, its shortness, its retractive capability, or its strength, will be fully satisfied that "if it cannot go beyond that line" it is perfectly capable of taking care of the contraction necessary within the limits of that line that Dr. O'Connor refers to, and gives ample internal rotation and convergence protection. In any event, the pull to which Dr. O'Connor refers is not a "straight pull" as he states, but is an oblique pull, for the origin of the internal rectus is the rim of the optic foramen, and the muscle runs obliquely outward to the globe, which gives it a purchase irrespective of the contact arc. This purchase is increased as the eye swings out to correction.

Criticism—page 1138, col. 1, line 39:

"Another important point mentioned by Dr. Curdy is that the formation of adhesions behind the point of scleral fixation brings about a greater recession, because the point of action is from the rearmost adhesion."

Answer.

Dr. O'Connor has just argued that there is no contact arc in cases in which recesssion is to the equator. Why then worry about adhesions when there is no contact arc to adhere to the globe? These two criticisms when placed together would seem to border on the ridiculous. The question of action only from the most posterior adhesion can be applied to every type of tenotomy, recession, shortening, or advancement. If applied literally in every case it would develop into the highest realm of absurdity. With its application, the contact arc of an advancement or shortening would be completely lost, for the separation from the globe must necessarily be accomplished well behind the equator and adhesions form to that point. The O'Connor cinch would be rendered a nebulous procedure devoid of correction, because the tendon which has to be exposed and slit into its component parts would adhere in its entirety, and the much lauded two-stage tenotomy would be subject to the same incorrigibility which Dr. O'Connor would leave at the door of recession. Every operation for advancement, tenotomy, or recession would be receded or shortened to the equator, giving the "straight-line pull" which Dr. O'Connor mentions as a defect of recession.

Criticism—page 1138, col. 1, line 47:

"How then can interference with conjugate action be avoided or anything but an noncomitant condition be procured? It is inconceivable that conjugate impulses to muscles with such large differences can result in parallel action. . . ."

Answer.

It is not inconceivable for the reason that experience in the practice of the entity of recession has demonstrated,

1. That it protects convergence and duction to the highest degree obtainable by any type of tenotomy.

2. That in the hypertense, highly muscularized types of deviation, a simple or bilateral recession will, if conservatively performed, give a more uniform and better-protected return of correction than any single or combined procedure.

3. In cases where a division of procedure is advisable, it will protect against over- and undercorrection by the support it gives both to the recession and to advancement, and this more especially if the ratio of 1 mm. of recession to 2 mm. of advancement or shortening is adhered to.

As already stated, a tenotomy or recession of some type has to be performed when an advancement or shortening has failed to correct the deviation, and no one can gainsay that an accurately graded, sclerally secured, and broadly inserted, unmutilated muscle will do better work than an ungraded, indefinitely secured, and indefinitely inserted muscle.

Criticism—page 1138, col. 2, line 27:

"I have operated four times for di-

vergence secondary to recession, and in each case have measured the setback with Walker's scleral rule. All had marked reduction of inward rotation and, of course, impaired or no convergence. One had 2 mm., two had 3 mm., and one had 4 mm. of setback. All, therefore, were well within Jameson's allowable limit and yet in all there was marked interference with binocular or monocular action. In each instance a cinch shortening of the reset tendon gave satisfactory cosmetic results and a large increase in inward motion."

Answer.

Dr. O'Connor omits to mention the thousands of cases surgeons find in which these untoward symptoms after operation are not present and in which a perfect correction was obtained. Heuven, in 1928, compared the results of operations in two clinics in Utrecht where different techniques were practiced, and states: "In the clinic of H. Snellen, Jr., tenotomy was performed, and in R. Lindsay Rea's clinic recessions were done. The results were as follows: When tenotomy was practiced there were three times as many overcorrections as when recessions were performed" (Travers, T. àB. The comparison between the visual results obtained by various methods employed for the treatment of concomitant strabismus. Brit. Jour. Ophth., 1936, v. 20, Supplement Monograph I, p. 83, line 3). The reciting of this picture is anything but convincing without an understanding of the primary condition for which the recessions were done. The first three, one of 2 mm., two of 3 mm., would at once suggest to the experienced operator practicing recession that they were of that type in which there was primarily a remote near point of convergence with the accompanying symptoms of underlying insufficiency of the deviating muscle, and should never have had a recession or a tenotomy performed. This is corroborated by the fact that a single, sclerally fixed, broadly inserted, properly computed recession of the 2 and 3 mm. mentioned would never have produced overcorrection if the muscle operated upon had been of the hypertense type and a proper subject for recession. The fourth case of 4 mm. might well come under the same category but again fails in its attempt to discredit recession at large. It does not even state if a superimposed advancement was done at the same time, which might even be the possible factor in overcorrection. The superimposition of a high-tension operation (that is, advancement or shortening) might well nullify a recession which did not require it. Dr. O'Connor omits the very significant fact that he evidently found the muscle ends and insertions where they had been primarily placed. It is remarkable that with a procedure which so many are initiating themselves in the performance of a new technique which always requires both skill and judgment there are comparatively so few under- and overcorrections; as the operator becomes more adept in computation and technique and leans toward conservatism, the untoward corrections common to every operation diminish very perceptibly. There are no secondary deviations as mentioned by Dr. O'Connor. The overcorrection occurs at the time of operation and is more likely to improve than secondarily to deviate.

Criticism—page 1138, col. 2, line 42:

"The only reason for scleral-fixation sutures is the common idea that a cut tendon fails to reunite with the globe."

Answer.

This statement is quite incorrect. In the first place the common idea is not that "a cut tendon fails to unite with the globe" (in most cases it does), but that the point where it does unite is quite problematical unless properly restrained, and scleral fixation is the best form of restraint. Instances have been found where the muscle end found postorbitally had only indirect connection with the globe by intermediary fascia. Dr. Duane witnessed a case in which the muscle end was blended with the conjunctiva alone. Moreover, a tenotomized muscle, unsecured, may retract within its capsule.

Criticism—page 1138, col. 2, line 49:

"Moreover, in my two-stage tenotomy the central portion is always firmly

attached when the marginal cuts are made six weeks later."

Answer.

Every operator of any experience knows that a central tenotomy is attended with the most meager amount of correction. The fixation which my critic stresses would be found at or about the same point where the central tenotomy was made, and would be of almost negligible quantity. The lateral cuts necessary six weeks later savor of "a cut-until-effect-is-obtained tenotomy" and in this instance finally a mutilated tenotomy with probable pointed attachment. Moreover, if the case were of the markedly overmuscularized type, the slight central fixation (doubtfully accomplished) would probably have to be swept away before the muscle end could be brought to the point approximating the equator and before the desired correction could be obtained.

Criticism—page 1138, col. 2, line 52:

"Reattachment is certain if the tenotomy is done as a subcapsular operation through an incision parallel to the tendon fibers. . . ."

Answer.

All true recession tenotomies are subcapsular, and it makes little difference whether they are made through an incision parallel to the tendon fibers or in the usual way. If anything, the popular manner would make for more satisfactory anatomical adjustment. It would appear from Dr. O'Connor's statement that incisions parallel to the fibers of a two-stage tenotomy are permissible but not with recession.

Criticism—page 1138, col. 2, line 55:

". . . because the overlying capsule and conjunctiva hold it in close contact with the globe."

Answer.

The fallacy of this statement can be readily perceived when the movability and laxity of the conjunctiva are remembered, and that after exposure a lax capsule in many instances admits of its being moved or dragged in a radius of 5 mm. in any direction. The compressive security obtained through the medium of a capsule which has been liberated or a conjunctiva which is lax and freely movable may be virtually nil.

Criticism—page 1139, col. 1, line 2:

"From personal experience in many operations I know that a subcapsular tenotomy limited strictly to the tendon proper and made by extending a central buttonhole does not appreciably reduce either inward rotation or convergence."

Answer.

If it does not appreciably reduce the inward rotation of an internal deviation little has been accomplished, and it goes without saying that a tenotomy, uncomputed, ungraded, nonrestrained or sclerally fixed, with indefinite pointed attachment, will not protect convergence or rotation to the extent that an operative procedure which embraces these requirements can accomplish.

Criticism—page 1139, col. 1, line 14:

"The general principle in muscle surgery is so to perform each operation that no mechanical harm can result and to correct the original causal condition. This was emphasized long ago by Stevens. It means that a tenotomy of the left inferior oblique for hyperphoria due to paresis of the right superior rectus is wrong. And yet many authorities advise just this procedure."

Answer.

It may seem wrong to Dr. O'Connor but the generally accepted method by those who have done by far the most to put vertical-muscle deviations upon the best operative plane for correction is the broad one, to put the emphasis of operation where it is required, that is, to tenotomize the muscle which evidences hypertension (marked secondary deviation) or to advance the weak muscles on the opposing side when hypertension is not evidenced, or to combine both if computation indicates. Dr. Stevens nearly always primarily attacked the hypertense muscle when performing his graduated tenotomies.

Criticism—page 1139, col. 2, line 6:

"However, I am sure that my two-stage tenotomy and the subcapsular tenotomy (in some cases) when properly combined with a cinch shortening

will give the desired results with the least risk to the eye and its functions. Those who do not use the cinch operations properly have no idea of what can be done, in safety, with all kinds of muscle imbalances."

Answer.

One is not called upon to evaluate tenotomy; history has done that: sometimes holding splendidly, sometimes correcting insufficiently, but always erratic. It was discarded as a primary procedure by the average surgeon. As to Dr. O'Connor's two-stage tenotomy, Dr. O'Connor's procedure can only be classified among the mutilating tenotomies which after the second subcapsular separation and the supposed anchorage from the buttonholed tenotomy is swept away, leaves a semimutilated muscle to protect convergence. Any one familiar with the anatomy of muscle and capsule after exposure of the field of operation would realize that the buttonhole or central tenotomy would only "tickle" a highly muscularized, large, tense giant muscle, as far as correction is concerned, and any slight fixation to the globe obtained by it would be wholly insufficient and, as already stated, would have to be swept away to obtain correction; and this pertains in part to most of the hypertensive types.

I have to date particularly refrained from criticizing the O'Connor cinch-shortening operation, feeling that as a matter of tact and taste, if nothing more, such criticism might well be left to others.

But as Dr. O'Connor has not only attacked the entity of recession but introduced into his attack, as one of the chief reasons for the depreciation of the operation, the suggestion that it be discarded for his cinch and two-stage tenotomy, it leaves me no alternative in answering his criticism but to evaluate the cinch operation.

This may be done on four scores: 1. Its surgical performance. 2. Its reaction. 3. Its corrective capability. 4. Its safety.

1. Its surgical performance.

It is, I believe, without doubt the crudest and what might be termed the least truly surgical procedure that has been introduced in muscle work. Relying as it does on two principles: A. Semistrangulation of the tendon, which, if it does not invite necrosis, relies upon B. the inflammatory output of these strangulations to mat the attacked tendon into a coherent mass.

2. Its reaction.

It is the most highly inflammatory and reactive procedure of tendon operations in ocular surgical myology. The reaction is most severe, requiring some 13 to 16 days before the dermic suture material is removed and the strangulative process has done its work.

3. Its corrective capability.

On the score of its corrective capability a cinch must take its place among the many procedures in the armament of advancement under the classification of shortening when limited to the tendon alone which leave the muscle end at its normal insertion. And as such it has the most limited return of correction of any of the shortening operations. All the others—1. Advancement in front of the insertion without resection of tendon, 2. Advancement in front of the insertion with resection of tendon alone, 3. Advancement in front of the insertion with resection of both muscle and tendon, 4. Shortening or resection of tendon alone with natural insertion, 5. Shortening and resection of both tendon and muscle with natural insertion—have a much wider range of correction, which the cinch does not possess.

A cinch is limited to the tendon and is deprived of the accessory attributes of advancement and resection. As all of the 5- or 6-millimeter length of tendon cannot be fully strangulated and shortened, its utility is probably limited to a doubtful 3 or at most 4 millimeters of shortening. These are in no manner inspired millimeters, and the operation must be placed in contrast with the 10 to 15 millimeters of shortening of the operations of wider range and utility just mentioned which possess the attributes of advancement and resection.

There is nothing in the cinch operation that cannot be accomplished in a cleaner and more surgical manner by the many existing advancement, short-

ening, tuck, and resection operations, and indeed it is entirely inadequate when it is opposed by a highly muscularized, highly tensive muscle, which requires the extreme in millimeters of advancement, resection, and recession to correct.

It is doubtful also if a properly sutured resection or advancement will not hold better than the shortening obtained by strangulative inflammatory products, as in the cinch.

4. Its safety.

As to its safety, muscle operations are proverbially safe. Most operators of 40 years' experience, as in my own instance, have never lost an eye from a mucle operation, and they can count reactions of any noticeable severity on one hand. The O'Connor cinch with its extensive reaction and its inflammatory strangulative output cannot boast of a greater degree of safety than the cleaner, less reactive, and the more correctly surgical methods now in vogue.

The anonymous communication at the end of Dr. O'Connor's paper I leave unanswered, believing that anonymous quotations have no place in scientific documents.

And his hope that the entity of recession will be a thing of the past is, I fear, doomed to disappointment, considering its steady growth in the last 12 years, the results and satisfaction it has given to muscle work, and its firm intrenchment now in nearly every important ophthalmic center in the country.

139 Montague Street.

A SIMPLE TECHNIQUE FOR PLOTTING DIPLOPIA*

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The apparatus consists of a blackboard or tangent screen, a one-inch slit of light, a red lens in a trial frame, and a piece of red chalk. On the blackboard

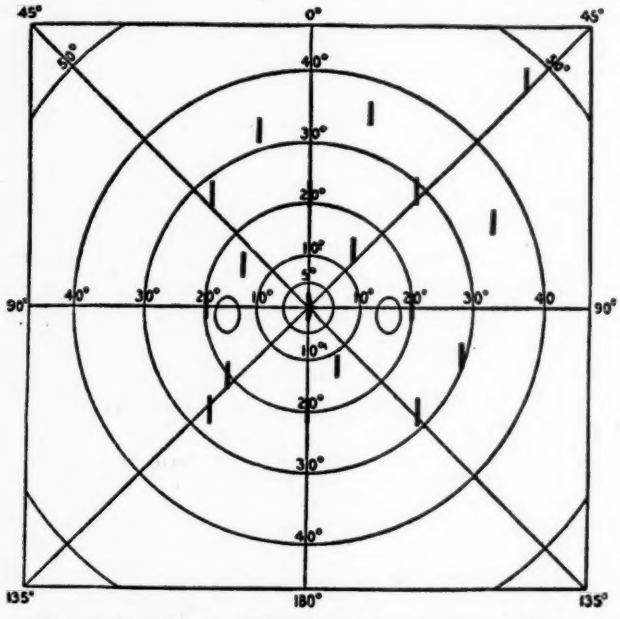

Fig. 1 (Rowland). O.S., Red false image. Paresis of superior-rectus muscle, left. A case of myasthenia gravis in an unmarried woman, aged 49 years.

is an adaptation of Peter's hand campimeter for a working distance of 33 cm. A slit of light is made by removing the head from an ophthalmoscope and hooding it with a four-dram vial covered with opaque paper. There is a slit, 4 x 25 mm. in size, rendered translucent by tissue paper.

* Presented before the New England Ophthalmological Society, Boston, February 18, 1936.

The patient, provided with a piece of red chalk, is seated comfortably before the blackboard and, having one eye covered by the red lens, is instructed to mark exactly over the red streak which he sees. The operator holds the slit of light first in the primary position, then 20 degrees to the right, left, and three similar positions 20 degrees above and below. The 20-degree circle has a radius of 12 cm. for the 33-cm. distance. One-inch marks placed on the blackboard by means of a white wax pencil give permanent location for the operator's light. Within a few minutes a record is made of the diplopia exactly as the patient sees it. The slit distinctly shows the tilting of images when the obliques are involved, a marked advantage over the other sources of light. Twenty-degree limits from the primary position are probably best as brought out by Friedenwald.[1]

The plot thus obtained is transferred to a tangent-screen chart for permanent record. Data thus obtained so readily and exactly are often more informative than descriptions of prism displacement. The graphic records serve well to illustrate the trend of the muscle fault, both to the patient and the ophthalmologist through subsequent observations.

A black-cloth tangent screen upon which records may be made by red pins, or a white sheet of paper whereon false images may be made by red pencil, are quite satisfactory substitutes for the blackboard. This simple procedure has been used successfully for a period of years by the author and is recommended for consideration. A record is appended.

84 Commonwealth Avenue.

SURGICAL-DIATHERMY EXTIRPATION OF THE LACRIMAL SAC

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Surgical diathermy has become thoroughly established in the treatment of retinal detachment, but its effective use in other connections still remains unknown to many eye surgeons. The following case report may demonstrate its extreme value, which has become well recognized by brain surgeons.

Mrs. T. I. W., aged 36 years, was troubled with an epiphora of two years' duration. An antrum operation had resulted in a bony deformity at the lower end of the lacrimal duct; chronic dacryocystitis followed and caused the tearing. Her doctor attempted to probe the duct on several occasions, and at each time a moderate swelling of the tissues resulted.

After one such probing she was brought to this city in a very serious condition; her temperature was 104° F. and the pulse correspondingly high. The left half of the face was intensely swollen, the edema extending to the ear and down into the neck. The lids were tightly closed and only with difficulty could the eye be inspected. The cornea was intact but bathed in pus that, on culture, grew hemolytic streptococcus. The lacrimal-sac region and cheek were tense.

After a few days of conservative treatment the temperature fell to normal. The swelling was reduced only a little by heat and local X-ray therapy. Finally a stabwound was made into the tear sac and the latter kept open by a drain. The pus was found to be like that obtained from the conjunctiva. Although the patient had improved generally, the local condition remained relatively unchanged.

Continued conservatism in treatment seemed unwise because of the danger to the cornea of the closed eye and of the constant fear of cavernous-sinus thrombosis. Therefore, under general anesthesia, the tear sac was removed by means of the diathermy knife. After the sac was exposed through the usual extirpation incision, a wire loop was substituted for the blade. The sac stood out round and firm, a grayish necrotic mass, and when the anterior half was looped away, it did not collapse but remained open like an empty peanut shell. It was easy to see why mere drainage did so little. The remainder of the sac was then looped away, the cavity loosely packed open and bandaged. Recovery was rapid, and one year later the patient made a visit here, demonstrating

[1] Friedenwald, Jonas S. Diagnosis and treatment of anisophoria, Arch. of Ophth., 1936, v. 15, February, no. 2, pp. 283-308.

an insignificant curved scar. Tearing occurred only when exposed to the wind.

Comment. The problem in this case was a very serious one, for the life of the patient was in considerable danger. The disease was not the usual acute abscess formation but an intense cellulitis, caused by a virulent organism. The region itself was doubly dangerous since it overlay the cavernous sinus. These facts made sharp dissection unsafe because of the possibility of spreading the infection.

To wait indefinitely would endanger the left eye. A corneal ulcer and panophthalmitis were constantly feared. Because of the swelling, treatment of the conjunctival sac was both difficult and futile.

The actual cautery would have been the instrument of safety a few years ago but the resultant burning is unnecessary and considerable and the scars unsightly. The cutting current of the heavy-duty diathermy apparatus seemed to fulfill ideally the requirements of safety and effectiveness in this case. The heat seared the wound edges as cutting took place and thus provided the safety of actual cautery. The incision, on the other hand, was as clean-cut as if made by a sharp scalpel. Furthermore, the diathermy knife cuts with no trauma, a consideration of great importance. The tissues divide actually ahead of the moving knife in a meltinglike process which is effected by the heat of the electric current. (The blade itself is blunt.) As a consequence, the entire operation was done without the use of forceps, the knife and the wire loop being the sole instruments. Absence of trauma in such a case was vital. The opportunity to work in such a field without manipulation of the tissues could be provided only by surgical diathermy.

823 Metropolitan Building.

EYE PHYSICIANS SELLING LIGHT

LOUIS LEHRFELD, M.D.
PHILADELPHIA

The "better light—better sight" campaign now being urged so extensively by electrical companies and the paint industry should be scrutinized carefully before its acceptance by ophthalmologists. Even though the lighting interests recommend frequent examinations of the eyes, I feel that eye physicians would fall short of their duty to the public if they sponsored this campaign without thoroughly understanding its implications.

From an ophthalmologist's standpoint, it is my opinion that the normal human eye will tolerate the lower intensities of light over longer periods than the higher. My own eyes prefer three to five foot-candles. Above this, I soon experience a sense of fatigue due to intolerance of excessive light.

The eye physician knows that the myopic eye will tolerate much less light than the hyperopic one, due to the difference in pigment deposit in the retina, choroid, and iris. He also knows that patients, after a prolonged illness, tolerate less light, due to the prolonged confinement to low intensities of light indoors.

The senile person with changes in the clarity of the lens, vitreous, and early atrophy of the optic nerve, requires more light for comfort and for seeing. There are so many wide variations of light for the purposes of seeing that it seems absurd to attempt to set a standard for all persons—the albino, the negro, the myopic, the hyperopic, and astigmatic, the high-tension neurotic, and the apathetic paretic. The thought of fixing a patient's quantity of light without certifying its quality for reading, is short of nonsense, especially if the doctor is requested to prescribe light for any individual.

The adaptability of the eyes to low and high intensities is so wide and varied that we are attempting to standardize with a degree of accuracy that which is adaptable to the dark of night and the brightness of sunlight.

We are told by the propagandists of more light, that our forefathers, our great literary geniuses, artists, and composers, ruined their eyes because they used candle light, oil light, or gas illumination at night. We are being led to believe that most of the population of today is developing serious eye diseases, because of the low intensities of illumination. I ask the ophthalmologists

if they can identify these diseases; are they classified in our literature? I cannot find a single disease of the eye, nor have I treated a single patient in my 20 years of practice for a disease due to low illumination for reading. Of course, one cannot read in the dark. There must be sufficient illumination for reading, or reading is impossible.

We are being told that the illumination in our examining offices for reading tests is much greater than that used by the patient at home. That is easy to answer. Our reading test cards aim to test accommodation and visual acuity, not light tolerance. For distance visual acuity we use low illumination to get accurate refraction. It does not follow that the patient must use the same illumination at home. Based upon this fallacy, or shall I say judgment, of an illumination engineer, we must change our whole system of eye examination, paying attention to measured light and ordering the optician to check upon our prescription of light.

A new test card is given us, changing the contrast of the white background of the reading paper with the blackness of the paper approaching the blackness of the print. I doubt whether this has any merit of accuracy in arriving at a prescription of lighting for reading.

An elaborate lamp and an ingenious light meter complete the requisites for determining light for each patient. The electric company sends a trained woman to change the lighting system of the home to conform with the oculist's prescription. In other words, the doctor ordered it. The responsibilities are his.

Let us examine the photo-electric cell, called a light meter. It designates how many foot-candles are needed for hallways, for reading, for needle work, for fine close work, and so forth.

I emphatically deny that the foot-candles as indicated on the face of this instrument are necessary for comfortable work. The instrument recommends far more light than is necessary. In fact it suggests light in such intensities as to be detrimental to good vision. By this I mean it suggests light far beyond a normal tolerance with comfort. This will mean photophobia, lacrimation, retinal fatigue, and general fatigue of the nervous system, conjunctivitis, and a reduction in time of reading ability.

Most of my myopic patients complain of too much light, and not too little. Patients who are glass wearers complain of surface reflection from other lights in the reading room. They complain of the quantity of the light. It is my contention that we should not stress so much the quantity as the quality of light, mainly its diffusion to avoid the glare from the filament of the bulb. Eye fatigue from low illumination is much less a problem than is eye fatigue from too much light and the glaring effect of the incandescent bulb.

Many devices have been adopted to apologize for the electric bulb. It is frosted, it is concealed by shades, its light is reflected, dispersed, diffused, refracted, reflected, because its glowing filament is too intense for the normal eye. When a new bulb is devised to eliminate this we will have solved much of the light problem as concerns healthful comfort of the eyes. The eye will adapt itself to a normal quantity of diffused light, but not to intense points of light of the unconcealed electric bulb.

Will eye physicians actually consent to sell electricity contrary to their knowledge of light tolerance? I suggest that the ophthalmologists refer this whole matter of a fixed measured light prescription, as advocated by lighting engineers and lighting industries, to the eye section of the American Medical Association for consideration and study.

If a committee of ophthalmologists, physicists, and lighting engineers, appointed by the president of the eye section of this association is given an opportunity to examine the instruments, lights, and test cards recommended by the sponsors of more light, and if they find the tests, methods, and instruments are scientific, and the findings are practical and to the best interest of eye health, then I say we should give our unqualified endorsement to more light for comfortable seeing.

I personally believe we could use more light, but that "more" is small and coupled with better quality. To force the eye physicians to accept an untried and unproved system of quantity light prescribing, will only react

unfavorably. I am sure the sponsors of more light would prefer to have the endorsement of the American Medical Association in so important a matter which concerns the health of the eye. Nationally advertised foods have secured it, based on scientific claims. So can the sponsors of light if they have scientific proof of their claims.

1321 Spruce Street.

SOME RESULTS OF ORTHOPTIC TRAINING IN ADULTS

MARTHA LYON, M.D.
SOUTH BEND, INDIANA

Case 1. C. M., aged 24 years, had known he could not see with his left eye since high school days, but he had never worn glasses. On November 7, 1933, examination revealed a convergent strabismus of the left eye. Vision O.D. was 20/20; O.S. 20/100. The fundi were normal. There was no stereoscopic vision. Under homatropine cycloplegia he required: O.D. +0.75 D. cyl. ax. 90°, vision = 20/20; O.S. +1.00 D. sph., vision = 20/65.

Orthoptic training with the telebinocular stereoscope was used in the office each week and the patient was instructed to occlude the good eye and use the squinting eye one-half hour each day, with his glasses on.

On December 9th the vision with glasses was O.D. 20/16 and O.S. 20/40. The eyes were straight.

In April, 1934, he was loaned a telebinocular stereoscope with cards for drawing at home and in June he could fuse all Kroll charts as well as Sattler charts, with which he had stereoscopic vision

Case 2. G. T., aged 40 years, had a marked convergent strabismus of the left eye with vision of light perception. After post-cycloplegic examination the following glasses were prescribed on February 7th: O.D. +1.25 D. cyl. ax. 90°, vision = 20/20; O.S. +0.75 D. sph. ⊂⊃ +2.50 D. cyl. ax. 90°, vision = light perception only.

Orthoptic training was suggested, and he was willing to try occluding the right eye at home and to report every two weeks. On March 1st, with the left eye he could see the color of his little daughter's dress, and the vertical line of 3/200 and in July the vision was 3/50 — 2. The eyes were comfortable and strabismus not so marked. He did not return for further training.

Case 3. A. S., a Polish farmer, aged 21 years, could not see well but had never worn glasses. He had marked convergent strabismus of the left eye; rotation to the midline was accomplished with the greatest difficulty. In March, 1934, under atropine cycloplegia full correction, from the retinoscopic findings, was prescribed as follows: O.D. +1.00 D. sph. ⊂⊃ +1.00 D cyl. ax. 90°, vision = 20/40; O.S. +1.00 D. sph. ⊂⊃ +3.00 D. cyl. ax. 45°, vision = 3/200.

Orthoptic training was started at home, by occluding the right eye one-half hour each day. By March he could hold the left eye in the mid-line longer and vision had improved to 10/200 in the left eye. The patient had an old stereoscope which he used under instruction to overcome the suppression in the left eye. In June the vision was O.D. 20/20; O.S. 10/200. One month later the eyes were much straighter and he could fuse the complete set of Kroll charts. The left eye still wandered up, down, and in, but it could be held in the midline for a longer period. In March, 1935, his eyes were still improving.

Case 4. T. P., aged 20 years, showed a marked convergent strabismus of the left eye. On May 11, 1934, under homatropine cycloplegia full correction was prescribed: O.D. +1.00 D. sph. ⊂⊃ +0.50 D. cyl. ax. 90°, vision = 20/24; O.S. +1.00 D. sph. ⊂⊃ +1.50 D. cyl. ax. 90°, vision = 20/24. Orthoptic training was started at home by occluding the right eye one-half hour each day. There was no fusion.

On May 22d he fused the Kroll charts for about one minute. Sattler charts were supplied for home training and changed each week and on June 19th he could fuse for a longer time, and began to see stereoscopically. The eyes were straight. In July he could see stereoscopically any one of the Sattler charts. Training continued during the fall and winter and in July, 1935, the eyes were straight and vision was 20/20 in each eye.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

LOS ANGELES SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

November 25, 1935

Dr. Walter Crane, president

Corneal laceration occurring in children

Dr. M. E. Trainor presented six cases of severe corneal laceration, accompanied in most instances by injury to the lens. He had repaired all severe lacerations with through-and-through corneal stitches, and did not use conjunctival flaps because they obscured the condition of the structures beneath. When secondary membranes formed, he thrust a cataract knife through the cornea at one limbus making counterpuncture at the opposite side, inserted iris hooks from each side, and tore the membrane by countertraction of the two hooks.

Discussion. Dr. M. Beigelman recommended that in all cases of perforating injuries of the eye, tetanus antitoxin should be given. He mentioned that 60 cases of tetanus from injuries to the eye were on record. He further advised the use of an antiseptic such as mercury oxycyanide, which was preferred by Elschnig, and the use of conjunctival flaps. He pointed out that where there was delayed union there was marked thickening of the cornea and sclera and considerable edema, which extended to the endothelium about the optic nerve and gave ophthalmoscopically the appearance of a choked disc. Sections had been made from such eyes and showed no inflammation of the nerve.

Dr. W. A. Boyce said that he had preferred large conjunctival flaps dissected back to the equator as in enucleation, and brought over the cornea with a purse-string suture, a pressure bandage being applied as a dressing. It was his opinion that corneal sutures were dangerous from the standpoint of infection, but he sutured the outer layers of the sclera when lacerations occurred in the sclera. For secondary membranes he preferred to make a keratome incision, free the posterior synechiae, and extract the membrane by twisting it with an iris hook.

Dr. S. Reina announced that he was in favor of neither sutures nor flaps, but bandaged the eye tightly for three to four weeks, changing the bandage every 24 hours, and instilling eserine daily.

Dr. Robert Miller preferred to suture not the sclera but the conjunctiva over it. He favored early removal of the lens by needling, when it was injured, and subsequent irrigation of the lens substance 24 hours later. He advised doing this before inflammatory reaction in the eye set in.

Dr. Trainor (in closing) stated that he used conjunctival flaps in the less extensive injuries of the cornea.

Corneal ulcer

Dr. W. A. Boyce described his personal experiences with a corneal ulcer which originated from a small scratch by a twig. Pain was the chief symptom, that from a ciliary spasm being relieved by atropine; from the fifth-nerve pain he obtained little relief by using anesthetics and ointments, but found five-percent dionin to be the most effective. All forms of heat were relatively unsuccessful except that from short-wave diathermy. He stated that the disturbance of binocular vision by the necessary wearing of a patch over one eye was most annoying. Relief from his pain and improvement in the condition was prompt after the ulcer had been curetted and cauterized with trichloracetic acid. He received twenty-five million organisms of typhoid vaccine by intravenous injection and experienced the most severe fever reactions, but prompt improvement in the condition of the ulcer. He believed that an ulcer should be curetted and cauterized daily as long as there was some staining of the area with flourescein.

Conical cornea

Dr. Ray Irvine reviewed briefly the history of conical cornea and its etiological factors, such as intraocular pressure, nutrition, essential structural changes, endocrine imbalance, and metabolic deficiencies. He stated that cases were on record in which several members of the same family suffered from the disease. Cases have been noted following thyroidectomy and in association with deficient calcium metabolism and low metabolic rate, and in association with multiple sclerosis. As to diagnosis, Dr. Irvine mentioned the dark central reflex seen with the ophthalmoscope, the use of the placeido disc, slitlamp, and ophthalmometer. He stressed the detection of early cases by means of photography where two corneal reflexes can be seen. He gave a review of the various forms of treatment, stressing Meyer Wiener's adrenalin treatment, and the use of contact lenses both as a therapeutic measure and for the optical effect.

Discussion. Dr. Clifford Walker suggested that treatment with a diathermy needle might replace some of the old cautery methods.

Dr. Irvine (in closing) mentioned that cases have been reported as developing after severe hemorrhage and the subsequent secondary anemia.

Harold F. Whalman,
Editor.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

December 17, 1935

Dr. James J. Regan, presiding

Color blindness

Dr. William D. Rowland reported the following case: An auditor, aged 64 years, came to his office for a change of glasses, complaining of photophobia and poor vision in the daytime. He had been told years before that he was totally color blind. His refraction was as follows: O.D. +1.50 D. sph. ⊂⊃ +1.00 D. cyl. ax. 120° vision = 20/100; O.S. +1.75 D. sph. ⊂⊃ +.75 D. cyl. ax. 60° vision = 20/100; with add. +2.50 D. sph., vision = Jaeger 10. His best vision for both distance and near was with the illumination reduced to two to three foot-candle power. The pupils were 3 mm. in size, and reacted only slightly to light; the ocular media were clear, and the fundi normal. There was some thinning of the retinal pigment. The visual fields also were normal, except for slightly enlarged blind spots and indistinct color scotomata. He could not read Ishihara charts with the possible exception of Plates 1, 5, and 8. He was also unable to distinguish any colors in the spectrum, but selected yellow as the brightest.

Being intelligent, and interested in his own problem, he was given the paper by Dr. S. Judd Beach on "Congenital color blindness" (Transactions of the Section on Ophthalmology of the American Medical Association for 1926). After reading this, he commented as follows: "My condition is of such long standing that it does not particularly distress me. Given the agreeable degree of light, such as twilight, my general vision is 'perfect'; on the ocean the sunlight does not seem to blind me so much as on land. No artificial light has any disagreeable effect on me except red or possibly yellow; pleasing fabrics are generally those having blue or green. Nature, out-of-doors, and a photograph of the same scene look alike to me. I cannot read black printing on deep red labels. A red traffic light, if I can see it at all, simply looks dull as compared to the green."

Malarial treatment of interstitial keratitis

Dr. Benjamin Riseman read a report on this subject, written in conjunction with Dr. H. Houston Merritt of the Neurological Service of the Boston City Hospital. According to the literature, which Dr. Riseman reviewed briefly, malaria therapy has shortened the course of the symptoms in many cases of interstitial keratitis in which the usual ocular and antiluetic treatment was inadequate. However, it did not bring about the absorption of preëxisting corneal opacities, nor improvement

in vision. Influenced by these reports, Dr. Riseman employed this form of therapy in the following two cases:

Case 1. A 15-year-old white girl was admitted to the Orthopedic Service of the Boston City Hospital with the diagnosis of congenital lues, luetic synovitis of both knees, and interstitial keratitis in both eyes. She complained of burning, lacrimation, photophobia, and blepharospasm. Examination showed marked conjunctival and ciliary congestion in each eye, and a ground-glass appearance of both corneas, which made it difficult to see the anterior chambers. Vision was 10/200 in each eye. Frequent previous attacks of interstitial keratitis had subsided in from three to five weeks under local and antiluetic treatment, and this treatment was again used, but with no relief from her symptoms at the end of seven weeks. Malaria therapy was then instituted, and the patient allowed to have 12 chills before quinine was administered. After the third chill, the burning and lacrimation had subsided, and the photophobia and blepharospasm had decreased. After the last chill she was free from all ocular symptoms, and was discharged from the hospital 10 weeks after admission. On subsequent visits to the Out-patient Department she showed no improvement in vision.

Case 2. A 16-year-old white boy was admitted to the Ophthalmic Service of the Boston City Hospital with the diagnosis of congenital lues, interstitial keratitis, and acute iritis. He complained of burning, lacrimation, blepharospasm, and photophobia of two-and-one-half weeks' duration. He had been receiving antiluetic treatment for the past five years. On admission, the vision of his right eye was fingers at six feet, that of the left eye, light perception with good projection. Examination showed marked ciliary and conjunctival congestion in both eyes, infiltration and some pigmentation of the deep layers of both corneas, deep and cloudy anterior chambers, muddy and swollen irides, and moderately dilated pupils. The fundi could not be seen. His tension was 18 mm. Hg (Schiötz) in both eyes. Five weeks after admission, his symptoms had not improved, in spite of continual local and antiluetic treatment. Malaria therapy was then instituted, and the patient allowed to have 10 chills. After the fourth chill, lacrimation, burning, and blepharospasm had subsided, and photophobia was markedly decreased. After the last chill, all ocular symptoms had disappeared, and the patient could count fingers at 10 feet with both eyes. There were grayish scars present on both corneas. On subsequent visits to the Out-patient Department he showed no improvement in vision.

From these two cases Dr. Riseman concludes that malaria therapy causes rapid subsidence of symptoms in cases of interstitial keratitis, without, however, any improvement in vision or absorption of corneal opacities. There have been no recurrences of ocular symptoms in either patient to date, and no apparent ill effects from this treatment. Dr. Riseman feels that while malaria therapy is not indicated in every case of interstitial keratitis, it should be considered in those cases which do not respond to a prolonged course of the usual ocular and antiluetic treatment, and that it is a reasonably safe procedure in the hands of competent administrators.

Surgery of the cornea

Dr. Ramon Castroviejo read the principal paper of the evening on the above subject, and presented lantern slides and colored moving pictures illustrating keratoplastic operations. His paper consisted of a summary of his important work on corneal surgery.

Trygve Gundersen,
Reporter.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section on Ophthalmology

December 13, 1935

Dr. H. E. Binger, president

Arachnodactyly

Dr. Frank E. Burch (St. Paul) stressed the frequent association of

ectopia lentis with arachnodactyly, mentioning the importance of familial and hereditary factors in the etiology. He spoke of the great disproportion between the length of the extremities and the total height, together with the fact that in arachnodactylic children there is a definite increase in the length of almost every measurement. The unusual elongation of the long bones is not accompanied by corresponding changes in thickness. In fact, there is no definite pathology other than the extreme lengthening of the bones. In one of his patients, the chief or dominating symptom was amyotonia without the marked skeletal changes or cardiac symptoms. In three other members of the same family, the characteristic skeletal changes were present.

Heart disease is a frequent accompaniment of this condition. In some instances, he believes the cardiac changes to be due to the chest deformity, although frequently a patent foramen ovale and valvular defect are present. Usually there is very little involvement of the nervous system and mentality is excellent.

Dr. Burch illustrated three instances of the so-called fruste form, in all of which there was glaucoma, and in two of which retinal detachment developed. All of these cases of the fruste form showed peculiar contractures of the elbows and hands, with inability to supinate normally.

He believes the incidence of ectopia lentis with arachnodactyly to be approximately 50 percent, the figures increasing slightly as the attention of ophthalmologists is called to the association of these two conditions. Dr. Burch had observed 16 patients with arachnodactyly, in nine of whom congenital and bilateral ectopia lentis was present. In two of the nine patients the dislocation of the lenses was downward; in all others it was upward. In two patients, one bilateral, the lenses were well down in the vitreous, but could be brought behind the pupil by placing the face downward. Neither of these patients had increased intraocular tension, both had useful vision in the eyes affected.

The chief interest to the ophthalmologist in the association of ectopia lentis and arachnodactyly is the problem of etiology. Although it is a fact that arachnodactyly is entirely a mesoblastic growth anomaly, it is generally conceded that the suspensory ligament of the lens is probably of ectodermal origin. Dr. Burch believes that the ocular manifestations are secondary and are really provoked by primary lesions of the mesoderm, either by abnormal persistence of the capsulo-pupillary vessels or as suggested by Dr. Ida Mann, whose explanation of the hereditary and familial history is of interest.

Dr. Burch quoted Dr. Mann as stating that certain chromosomes might be defective, and since there is no evidence which might lead to the supposition that mesodermal and ectodermal structures are segregated in different chromosomes, and, since the chromosomes carry many genes, there is no reason why the characters for the extremities may not be carried by the same chromosomes as those for certain eye characters. Therefore, the genic possibilities of origin deserve serious consideration.

The point was emphasized that in the examination of ectopia lentis one must consider also the clinical associations of skeletal, muscular, and cardiac defects, giving due consideration to the general physical phases of the patient, and not alone to those pertaining to the eye.

Discussion. Dr. John S. Macnie (Minneapolis) reported two cases, as follows:

Case 1. Mrs. I. M. K., aged 48 years, presented the history of congenitally dislocated lenses in both eyes. She was very tall and slender with very little subcutaneous fat, long fingers and feet, long head, and high arched palate. This patient had been seen by his colleague, Dr. Watson, in December, 1920, at which time the right eye had been blind for ten years following an operation, presumably for the extraction of the dislocated lens. The left lens was dislocated upward. The vision with a $+5.50$ D.sph. $\bigcirc$ $+1.00$ D.cyl. ax. 30° was 20/50.

Dr. Macnie enucleated the right eye

at the University Hospital in 1928, because it had become painful and inflamed. The patient was fitted at that time with a —26.00 D.sph., in the left eye, which gave her 20/50 vision. By placing her glass slightly forward she could read Jaeger 1. In August, 1933, she was again tested, when the correction in the left eye was reduced to —22.25 D.sph., which gave her only 20/200 vision.

The patient reported at intervals for observation and at times sudden movement made the vision extremely poor. It was necessary to order new glasses occasionally. The eye remained white, with a normal tension.

Case 2. Mr. I. K., 25 years old, was first seen by Dr. Macnie in June, 1929. He was the son of the patient in case 1, and was also very tall and thin. The lenses were dislocated upward in both eyes, were small, and transparent. This boy was ambitious to complete a college education and found the poor vision a serious handicap. On July 3, 1929, when he was 19 years old, Dr. Macnie attempted to needle the lens in the right eye. This small lens was very hard and movable and the needling resulted only in a partial opacity of the lens. It showed no evidence of absorption.

On September 17, 1929, a linear extraction was performed on the right eye with a sutured conjunctival flap. A simple extraction was deemed an inexpedient procedure, inasmuch as the small lens was dislocated up under the iris. An iridectomy was accordingly performed. The lens was easily expressed by placing the tip of a loop under the upper equator of the lens, lifting it out on the loop with the aid of pressure through the cornea. The vitreous presented but there was no loss. There was an uneventful convalescence, and the eye had since then been in a very satisfactory condition, except that the iris was somewhat drawn up. Vision was 20/30+ with +9.00 D.sph. ⊂⊃ +3.00 D.cyl. ax. 165°; +3.50 D.sph. added gave near vision of Jaeger 1.

The patient was very anxious to have the other eye operated on, so in November, 1929, the same procedure was undertaken. The final vision was 20/40 but the operation had been complicated by a loss of vitreous and an updrawn pupil.

In these two people, mother and son, there was a strong suggestion of arachnodactyly. They had the long bones and the long crania, high-arched palates, long fingers, and long feet. The lenses were, however, dislocated upward. There was no miosis, no curvature of the spine, no cardiac weakness. In the mother's family for two generations at least, no history of any similar condition could be elicited.

Dr. Burch (in closing) said that the only reason for bringing this subject up at this time was to emphasize the fact that few ophthalmologists knew what arachnodactyly was. When he had presented papers before other societies upon this subject, he was surprised to learn that men long in practice were not acquainted with this association of arachnodactyly and ectopia lentis. In one instance, a man who had practiced ophthalmology for half a century said he had never recognized a case during his life, but could recall several instances in his experience where this association of growth anomalies and ectopia lentis existed.

Walter E. Camp,
Secretary.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

November, 1935

Dr. J. Milton Griscom, chairman

Blood staining of the cornea

Dr. T. B. Holloway presented the case of a 10-year-old boy, who had been struck on the left eye by a stone. Twenty-four hours later there was an iridodialysis and a small hemorrhage in the anterior chamber, and on the following day the hemorrhage had increased. Sixteen days after the injury a paracentesis and irrigation of the anterior chamber was performed. When first seen by Dr. Holloway, about five weeks after the injury, typical blood staining of the

cornea was present and the vision was reduced to light perception.

He also presented the case of a girl aged 11 years, who had been struck on the left eye by a stone. During the next two days there were no recognized signs nor symptoms except some injection of the globe, but on the evening of the second day severe pain developed and the following day the vision failed. The patient was seen by Dr. Holloway six days later when the vision was reduced to light perception; there was marked bulbar injection, the anterior chamber was completely filled with blood, and the finger tension was plus 2. A few days later evidences of blood staining of the cornea were observed. This increased rapidly so that within three days the whole cornea including the periphery was deeply stained a yellowish brown. No immediate paracentesis was done because of some confusion pertaining to the cultures and it was thought there was a streptococcic contamination. Later a paracentesis was made with slow evacuation of the anterior chamber. With the first irrigation there was a remarkable clearing of the more peripheral parts of the cornea and the iris could be well seen, but the pupillary area was partially obscured by the remaining central staining. The pupillary area measured about four millimeters and was covered by a dirty-yellow discoloration except for a narrow black crescent along the lower pupillary border. On further irrigation the cornea cleared still more, and the whole pupillary area became black. At the present time there is still some injection of the globe, and there remains a slightly stained pear-shaped area in the center of the cornea.

Discussion. Dr. Alfred Cowan said that blood staining of the cornea is much more common than the literature would indicate. There is always a greater deposit of granules in the central portion of the cornea, arranged so densely that the gross appearance is that of a brownish disc in the aqueous. This occurs even though, as sometimes had been seen, the upper margin of the hyphema is below the densest area of staining. One would suppose that the contrary would result; that is, that the cornea would take up the greatest amount of granules at the place where the blood is in contact. He said that the corneal staining does not depend on permeability of the endothelium. Any number of cases where the endothelium is broken and in some instances is entirely absent are seen while the cornea remains perfectly clear. He had even seen instances where there were deep clefts into the cornea proper without absorption of aqueous.

The fine granules come forward into the cornea proper and, as the condition progresses, migrate toward the anterior surface, spreading out, becoming less crowded as the cornea seems to clear. The periphery of the cornea is comparatively clear although there are also some granules deposited there. It is peculiar that the staining is more pronounced in the central portions of the cornea than around the periphery. Probably, the cell spaces or lymph spaces are larger there than near the limbus. In blood staining, granules are of a brownish-red color by direct observation. The greenish hue seems to be a diffuse halo that cannot be seen when looked at directly. In the late stages, as the cornea becomes clear, the granules can be seen to have advanced to a plane just behind Bowman's membrane, always leaving a very narrow, clear space immediately beneath the anterior surface of the cornea.

The histopathology of choked disc

Dr. Bernard Samuels (New York) said that the basis of the demonstration consisted of preparations of edematous nerve heads taken from 50 cadaver globes, the diagnosis of papilledema having been made in each instance in life. Of this number the cause of the edema was given in life as brain tumor in 14 cases, and in the remaining 31 cases a variety of causes, such as nephritis, meningitis, exophthalmos, and anemia was assigned. It was possible in the sections to differentiate between the recent and old cases. In the recent cases only a separation of the nerve fibers by fluid was present, whereas the old cases were marked by atrophy of

the ganglion-cell layer of the retina and of the nerve bundles and proliferation of the endothelial cells of the capillaries and of glial cells in the papilla.

In measuring the amount of the swelling in the anatomical preparations, the diameter of the sclero-choroidal canal was taken as a standard for estimating the diameter of the swelling, and the thickness of the edematous disc was spoken of as being equal to or so many times greater than that of the retina. In some instances the neuritic roll compressed the retina; in others it pushed it aside laterally or forward and often threw it into folds. A peculiar triangular tissue that appeared mostly on the nasal side of the regular neuritic swelling that sometimes contained blood vessels was noted as well as changes in the pigment epithelium. No outspoken inflammatory reaction was noted in any of the papillae, no matter what cause was ascribed for the swelling. In so much anatomical material it is of interest that the intervaginal hydrops seemed to bear no relationship to the amount of swelling of the papilla. It was found that extreme edema was not always associated with marked hydrops.

A. G. Fewell,
Secretary.

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THROW AWAY YOUR GLASSES

The history of quackery constitutes one of the most curious chapters in the records of humanity. The outstanding facts appear to be that the world is never without a goodly sprinkling of clever imposters, persons who are brilliantly successful in misleading others for a pecuniary reward; and, on the other hand, that a very large percentage of the human race is at all times ready and even eager to be fooled.

It is now almost a daily occurrence for the eye physician to be asked by patients what he thinks about "eye exercises." Knowing that this expression belongs chiefly to the vocabulary of the professional quack, the oculist's reply to such inquiries is likely to be rather explosively vigorous or contemptuous, and perhaps not sufficiently explanatory. Most of us are so sure of our own ground, so intimately conscious of ocular structure and optical principle, that we hardly give sufficient consideration to the perplexity of the patient who has heard of this or that alleged wonderful cure.

How many of us have had curiosity and patience to acquire and read the arguments of the professional eye exercisers? An enterprising colleague recently handed the present writer a volume printed in England and published by an American firm under the title "The improvement of sight by natural methods." The author is one C. S. Price, M.B.E., who describes himself as "Late Captain Australian Army Medical Corps, Principal of the School of Eyesight Training (London), Director of the Radionic Therapy Centre (London)," and who in the subtitle claims for his book that it is "A complete treatise upon the newer methods of treating all conditions of imperfect sight by natural means, and obviating the necessity for glasses, drugs, or operations."

Price evidently wishes to be regarded as highly respectable, and he makes occasional polite bows to the regular medical profession. His book "does not purport to be a treatise upon optics, nor should it be interpreted with undue criticism of orthodox methods." It gives "the actual principles and practice of the methods of Eyesight Training applied with such outstanding success for many years by the author . . . its instruction may be followed in all cases with perfect safety . . . no book can adequately take the place of a qualified personal instructor, who alone can diagnose and synthesize for each individual case." Price acknowledges himself the not too slavish disciple of the late revered "Dr. W. H. Bates, M.D."

On what new and startling basis does the author undertake to remove optical defects? Price's presentation is singularly lacking in any revolutionary statement as to the fundamentals of ocular anatomy. In fact, he has apparently delved deeply into a number of standard textbooks on the eye, and under such headings as "Short Sight," "Long Sight and Astigmatism," and "Squint" he follows for the most part quite ordinary lines. Under "Simple physiology of the eye" he mentions three theories, that of Helmholtz, that of Tscherning, and that of Bates (!), "who maintains that the ciliary muscle plays little or no part in accommodation, the adjustment being brought about solely by the action of the extrinsic muscles on the whole eyeball and not on the lens specifically." But Price carefully avoids controversy on this subject.

His actual heresies include statements that the "orthodox oculist," in using lenses and optical apparatus, "endeavours to cure one kind of strain by adding another"; that glasses maintain the error which they seek to correct; and that the exercises which he advocates restore normal focus. All such statements are categorically made, without any attempt at logical proof.

What are the therapeutic measures recommended, the so-called exercises which are to do away with the need for glasses? Essentially, they resolve themselves into a great variety of maneuvers, some ludicrous but many obvious and quite lacking in mystery, to produce relaxation of the eyes.

For example, if when tired of reading you have covered your eyes with your hands, you have (probably without knowing it) performed one of the classical "exercises" for "the improvement of sight by natural methods." This is practically what Bates and his disciples would call by the fancy title of "palming." Quite a fundamental maneuver, apparently, is the "reestablishment of normal blinking." "Flashing" is the process of regarding an object for three seconds only and then closing the eyes. "Shifting" is moving the focus from one point to another and avoiding a fixed stare. "Alternate focus" on near and distant objects is recommended, with each eye separately or both together.

"Dr. Bates," we are told, "wrote that central fixation was lost in all cases of abnormal conditions of the eyes, whether functional or organic." So you are to practice "central fixation," because "when an eye is suffering any refractive error of focus . . . the image is focused irregularly and over a larger area, with the result that many of the nerve ends of less sensitiveness, lying outside the macular area, . . . are taxed with a stimulus beyond their capacity, and the result is obviously a strain." The exercises proposed for restoring "central fixation" are quite childish and futile. One of them is to look repeatedly for a second at one of a group of large letters at its remote limit of visibility, closing the eyes in the intervals, "until you feel you can ignore the other letters." Another is to read through a circular hole in a card which is carried across the printed page. Another is "to examine the small spaces inside the letters of ordinary reading type."

"Methods of relaxation" include Bates's "palming" and "swinging." A good deal of nonsensical detail is given as to the precise technique of "palming," but practically it amounts to nothing more than resting the eyes by covering them while relaxing the mind. "Swinging" or "swaying" is little more than rhythmic turning of the body from side to side with the eyes closed.

The chapter on "Exercises in visual coördination" includes a series of tongue twisters such as our old friend "Round the rugged rocks the ragged rascals ran." The chapter on "Visual illusions" reproduces a series of familiar diagrams, study of which by the patient is supposed to stimulate the ability to change focus at will.

Most of the material in Price's book serves as bait, of relatively harmless appearance, for attracting the reader to the author's "clinic." But here and there he indulges in claims which go beyond the idea of throwing away your glasses, and which can only be described as criminally and inhumanly dishonest. His special methods are applied to "diseased eyes and blindness." "Swaying" exercises are used in cases of glaucoma, in which "considerable relief and improvement are possible along the lines indicated in . . . this book." In nystagmus he claims "most excellent and permanent results . . . by . . . palming, swaying," and other exercises. For amblyopia "the general principles of eyesight training advocated . . . will invariably prove completely successful even in the worst cases." ". . . practice of the principles of macular vision will, in most cases, be . . . successful in . . . reestablishing the colour sense." A special chapter is devoted to "Blind and incurables." "Such cases as can and have actually been benefited, include . . . ophthalmia neonatorum . . . retinal detachments, as well as many postoperative cases of glaucoma, cataract and associated conditions."

After reading Price's volume, one wonders what it is all about, and the answer is that any excuse will serve to encourage omission of glasses by those who need them but are prejudiced against their use. The colleague referred to early in this editorial suggests that he who undertakes to advise in matters of health should possess three qualities; namely, natural intelligence, education, and honesty. Those whom we regard as quacks may possess two of these qualities but not all three. The reader may form his own conclusion as to which of the triad of qualities is most lacking in Price's case.

The incontrovertible physical facts which utterly contradict the fantastic statements of Bates and his followers, including Price, are those of ocular structure and measurement and of physiologic optics.

A difference of one fiftieth of an inch in length of the eyeball represents a very important difference in focus of parallel and other rays upon the retina. If, other things being equal, the eye is one fiftieth of an inch too short, then the eye is roughly one-and-a-half diopters hyperopic or farsighted, and is subjected to the formidable amount of eyestrain that this refractive error involves. If, in relation to the refractive value of the ocular media, the eye is one fiftieth of an inch too long, then the eye is approximately one-and-a-half diopters myopic, with a correspondingly pronounced defect of shortsightedness or myopia.

The ophthalmometric measurements of corneal astigmatism, constant from day to day and often from year to year, are irrefragable proofs that we are dealing with an organic defect of corneal curvature. The facts disclosed by the ophthalmoscope, retinoscope, and trial case may be less obvious and in part more complicated for the feeble or unwilling understandings of quacks and prejudiced patients; but they are none the less conclusive and irrefutable to the trained and intelligent mind. For people like Bates and Price to deny these facts is evidence of ignorance, obtuseness, or dishonesty, or sometimes of a combination of more than one of these mental and moral shortcomings.

W. H. Crisp.

FREE-CIRCULATION MEDICAL ABSTRACT JOURNALS

For a quarter of a century newspapers and magazines have been receiving an increasing part of their revenues from advertising, until, finally, it has been found possible to publish some periodicals with free subscriptions, provided the circulation is sufficiently large to attract many advertisers and induce them to pay big fees for advertising space.

Recently this type of periodical has entered the medical field in the form of free-circulation medical abstract journals. One of these lies before me now. In red letters at the top is the inscription "Circulation this issue exceeds 130,000 copies." Quite an appeal to any advertiser of medical supplies! Before me also lies one of several letters received during the past six months in which such magazines as the above are viewed with alarm and publishers of journals dependent largely or entirely upon subscriptions are urged to have all their material copyrighted, so that it can be neither abstracted nor quoted without permission.

Obviously, the matter concerns the welfare of the profession and should be given serious thought, although thus far it has not seemed to be of great moment. So much energy is wasted in anticipating trouble that it has appeared wise merely to watch the progress of this venture for a while before deciding whether to take action or not. A great deal of time and work is spent on the abstract department of this Journal and its welfare is most important to this magazine. It is the section that is read first by the majority of our subscribers. It averages more than fifteen thousand words and one hundred abstracts in each issue. The effort required in abstracting and editing so much material can be readily appreciated.

The free journal before me has a section devoted to ophthalmology. In this issue only one article is abstracted. This is done rather fully but only fairly well, apparently by someone other than an ophthalmologist. In its present state this magazine would not interest those in our specialty from the ophthalmological standpoint, but this may be only the beginning of a more pretentious effort.

Occasionally we are asked why we do not greatly reduce the Journal price and seek thereby to have a very large circulation, thus increasing the revenue from subscriptions and the appeal to advertisers in order that we might conduct an even more comprehensive abstract section than we now do. The fallacy in the idea is simply that there are not enough ophthalmologists in the country to render such a plan feasible. Less than ten thousand physicians in the United States practice ophthalmology. That any considerable number of physicians outside of this group should be interested in a specialty journal is scarcely conceivable; therefore, the upper limit, if all subscribed, would be less than this figure. When a deduction is made for the surprisingly large group that has no interest in the literature of their profession and from year to year scarcely open a medical periodical, and those who have access to the medical volumes belonging to friends or to libraries, there are not many to whom the Journal is not now accessible. The relatively small increase in subscribers that even a radical reduction in Journal rates would produce would certainly not attract advertisers and would not nearly compensate for the financial loss from the price reduction. The worst years of the depression were successfully weathered and the last two years have witnessed a definite improvement. If this continues we hope to increase all of the departments of the Journal.

The ultimate criterion of value of the free journals must be whether they will be of advantage to the profession or not. It is always pleasant to get something for nothing, but if this necessitates the elimination of something better the matter assumes a different aspect. The mere fact that the type of magazine dependent on subscriptions might have to be discontinued is relatively unimportant, but that it should be replaced by something less good is vital. This would seem not unlikely, for it is scarcely conceivable that a periodical that depends on advertisements for its existence would long remain independent of the advertisers. That such an outcome would be greatly to the disadvantage of the medical profession seems too obvious for comment. And when we mention the medical profession thus, we should also include the entire population, for everything that lowers medical standards is certain to reflect adversely on the public.

For these and other reasons we believe that although the specialty journals that are devoted largely to the publication of original articles may not be injured for a considerable time by free-circulation journals, there is an immediate danger to abstract journals conducted on other bases and possibly ultimately to all other medical periodicals.

Journals depending largely or solely on subscriptions already have the competition of those that are published at a financial loss by organizations that include the subscription price wholly or in part in the society dues and thus underwrite their publications indirectly. Other competitors are those associations publishing several journals at a loss that is overbalanced by the gain from other journals which they issue at a good profit.

There are so many factors involved in this subject of free journals that it may be as well to take no action for the present but only to watch and wait.

Lawrence T. Post.

BOOK NOTICES

Squint training. By M. A. Pugh. Cloth binding, 117 pages, 42 illustrations. Published by the Oxford University Press, London, 1936. Price not stated.

The reviewer has found this book the most complete and helpful of any of the recent monographs on the subject. There is considerable similarity between the author's point of view and that of Travers, as presented in his monograph (reviewed in the March, 1936, number of this Journal).

Two of the points especially stressed are the importance of normal and abnormal retinal correspondence and the value of orthoptic training both before and after surgery, when operation is necessary. The author believes that abnormal retinal correspondence can be changed to normal in many cases by training and that this should be accomplished if possible before surgery is attempted. The value of early and energetic fusion training as soon after operation as is safe, is urged.

Another valuable suggestion is that unintelligent use of the stereoscope is often a greater hindrance than help, because it may serve to fix abnormal retinal correspondence, deepening the tendency in the patient to combine the image seen with the abnormal area with the exact image of the fixating eye. This point is well taken, as not infrequently the ophthalmologist, having straightened the eye, advises the patient to purchase a stereoscope and after a few poorly understood remarks casts the patient loose to work out his own correction, which he seldom accomplishes. Miss Pugh points out the necessity of frequent observation and instruction in the office or clinic. We quote the author's conclusion:

". . . it appears that the best results are obtained by giving the first consideration to the prevention of amblyopia by occlusion and training. Secondly, where possible the deviation should be reduced by orthoptic exercises only, in order to leave the patient with good binocular vision and perfectly functioning muscles. Thirdly, where operation is necessary this should be performed after the eyes have been taught to work together and training should be continued afterwards to consolidate the result. In this way most cases of concomitant strabismus may be dealt with successfully."

Lawrence T. Post.

OBITUARIES

Emanuel Frank Snydacker, 1870-1936

Dr. E. F. Snydacker, born August 24, 1870, was the son of Hannah and Godfrey Snydacker, at one time Prussian consul in Chicago. He was educated in the Chicago public schools and entered Yale as the Chamberlain Greek Scholar, graduating in 1892. One year was spent in business and he then entered the College of Physicians and Surgeons in Chicago, receiving the M.D. degree in 1898. He took his interneship at the Illinois Eye and Ear Infirmary, where he received his preliminary specialistic training and did some investigative work upon the etiology of trachoma. His

further training was in Freiburg i.B. for several months, then as volunteer assistant in the clinic of Hofrat Fuchs in Vienna, and finally in the Eye Clinic of Leber in Heidelberg. Upon his return to this country he started private practice in ophthalmology, which he continued without interruption until his death, May 9, 1936. At various times he was Chief of Ophthalmic Staff at Michael Reese Hospital, Cook County Hospital, and St. Mary's Hospital. In his earlier days in practice he was an extensive contributor to ophthalmic literature, writing particularly upon purely clinical topics.

His tastes were catholic, evidenced by his interest in good music, literature, painting, and the finer things in life. Personally, Dr. Snydacker was extremely simple in his demands, preferring a Ford to a Rolls-Royce. Golf, gardening, and wood chopping constituted his recreations, together with an occasional sea voyage. During his later years, he devoted less time to his professional work and more to the enjoyment of living.

Harry S. Gradle.

Jean McNaughton Matteson

We learned with much sorrow today of the death of Miss Jean Matteson, former assistant manager of the American Journal of Ophthalmology, on June 13th at Evanston, Illinois.

Miss Jean McNaughton Matteson, born in Chicago, September 3, 1858, was the daughter of Andre Matteson, at one time editor of the old Chicago Times. She lived alone at 2531 Jackson Avenue, Evanston. She was a member of the Evanston Country club, the Evanston Historical society, and the Chicago Apollo club. Miss Matteson served for ten years as an executive of the American Journal of Ophthalmology, resigning in 1928 when the business office of the Journal was moved to St. Louis. From the introduction of the first volume of series 3 of the Journal in 1918 until this date she was well known to its editors and directors. She was most conscientious and faithful in the discharge of her duties and always had the welfare of the Journal foremost in her thoughts. We extend to her family our sincere condolences.

Lawrence T. Post.

CORRESPONDENCE

Sympathetic uveitis after iridotasis

May 26, 1936.

The Editor
American Journal of Ophthalmology:

In the issue of your Journal for May is an editorial by Dr. Crisp in which he takes exception to my statement that "Owing to the danger of sympathetic uveitis incident to iridotasis, in cases of chronic glaucoma I have with increasing frequency resorted to trephining." For many years I employed a modified type of iridotasis almost to the exclusion of trephining, and I made this statement simply to explain why I am now employing trephining to some extent. Dr. Crisp evidently considers my fear of greater danger of sympathetic uveitis after iridotasis than after trephining as unjustifiable, and implies that it is based upon a single case. As a matter of fact, so far as my own operations are concerned it is not based even upon one case, for sympathetic uveitis has not occurred after any of my operations for glaucoma. It is based, however, upon my personal observations. In an unselected series of 35 cases of sympathetic uveitis reported by Verhoeff and Irvine,* in which treatment with diphtheria antitoxin was carried out under my direction, there were four cases following iridotasis, three of which were "proved" by microscopic examination, and only one case following trephining. The latter case was "unproved" because no specimen was removed for examination. Moreover, of the many eyes I have examined microscopically that showed sympathetic uveitis, a few had been subjected to iridotasis, but not one had been trephined.

I am now endeavoring to perfect an instrument for trephining by means of which drainage as satisfactory as I have

* Verhoeff, F. H., and Irvine, S. R. Sympathetic uveitis, results of treatment with diphtheria antitoxin in 35 consecutive cases. New York State Jour. Med., 1936, v. 36, Jan. 15, no. 2.

secured after iridotasis may be obtained. If I am successful, I shall entirely abandon the latter operation owing to the danger of sympathetic uveitis.

Very truly yours,
(Signed) F. H. Verhoeff, M.D.

Correction of a legend

July 8, 1936.

Editor,
American Journal of Ophthalmology:

In the paper by Dr. Castroviejo and me on "Microanatomy of the eye with the slitlamp microscope" (May, 1936), an error slipped into the legend for Fig. 26 on page 381. In the third line from the bottom, instead of D, Descemet's membrane, it should read: D, dome of the cornea.

As this error is of importance, we shall appreciate the publication of this letter.

Very sincerely yours,
(Signed) M. Uribe Troncoso.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, history
19. Anatomy, embryology, and comparative ophthalmology

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1. GENERAL METHODS OF DIAGNOSIS

Burke, J. W. **Luminous dial.** Trans. Amer. Ophth. Soc., 1935, v. 33, p. 396.

The author exhibited a luminous dial with a central target and figures of radium paint for use in the dark room.

C. Allen Dickey.

Cardell, J. D. **Recent developments in the use of polarized light in ophthalmology, with special reference to its use in ophthalmoscopes.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 158.

The author describes the development of the Nicol prisms. He made use of them in an ophthalmoscope, using polarized light to eliminate the corneal reflexes. This type of ophthalmoscope permits a clear and uninterrupted view of the macular region, even through a pupil small under the influence of eserine. The instrument also facilitates examination in the presence of corneal and lenticular opacities. The same principle is applied to retinoscopy.

Beulah Cushman.

Correa Meyer, J. **The value of retinography in ophthalmology.** Rev. Oto-Neuro-Oft., 1936, v. ii, Jan., p. 3.

The great progress in fundus photography is reviewed. Black and white fundus photographs, as suggested by Belfort Mattos, should be called photoretinographs, and those in color photochromoretinographs. The former records especially retinal and the latter choroidal lesions. M. Davidson.

Foster, John. **The clinical value of color fields.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 305.

After careful survey of Ferree and Rand and Wentworth, the author concludes that little faith can be attached to alteration in shape of the color fields when the white field is altered. That disproportion must be an extremely uncertain sign, in view of the variation in size of the color field in normal persons. (Illustrations.) Beulah Cushman.

Fry, G. A., and Bartley, S. H. **The effect of one border in the visual field upon the threshold of another.** Amer. Jour. Physiology, 1935, v. 112, July, p. 414.

The authors devised experiments to study the effect of stimulating one border in the visual field upon the threshold of a neighboring border. When the activating border acts on the sides of the test border, it tends to raise its threshold; when it acts on its ends, it tends to lower its threshold. By interposing a third border, the activity which spreads from one border to another can be blocked. M. E. Marcove.

Lebensohn, J. E. **Scientific and practical considerations involved in the near-vision test with presentation of a practical and informative near-vision chart.** Trans. Amer. Acad. of Ophth. and Otolaryng., 1935, 40th annual meeting, pp. 429-440. (See Amer. Jour. Ophth., 1936, v. 19, Feb., p. 100.)

Lopez Enriquez, M. **Further innovations for examination of the fundus with slitlamp.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 181.

Enriquez solved the problem of illumination by his double angle mirror, without contact glass, and the problem of observation by adding a Recoss disc with different ophthalmoscopic lenses, which permits of stereoscopic observation of an inverted air image of the fundus in the focal light of Gullstrand's slitlamp. C. Zimmermann.

Luedde, W. H. **Simplified ophthalmoscope and retinoscope as an accessory to a vest-pocket flashlight.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 398-399. (See Amer. Jour. Ophth., 1935, v. 18, May, p. 459.)

Mexina. F. M. **Ophthalmotonometry in the diagnosis of ocular tuberculosis.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 193.

The author finds tonometric variations as the earliest focal reaction of the tuberculin test. There is a primary rise of 10 to 15 mm. within one and one-half to two hours after the injection, and a secondary fall below the original tension, appearing four hours after the injection and lasting two or three days. The appearance of glaucoma or retinal detachment destroys the value of this reaction. Ray K. Daily.

Sobański, J. **An ophthalmodynamotonometer and its operation.** Klin. M. f. Augenh., 1936, v. 96, March, p. 351.

The instrument, which serves for measuring the blood pressure in the retinal vessels and the intraocular tension, is described in detail and illustrated. For better orientation an example of its use is added.

C. Zimmermann.

2. THERAPEUTICS AND OPERATIONS

Berens, Conrad. **A combination loupe and head mirror.** Trans. Amer. Acad. of Ophth. and Otolaryng., 1935, 40th annual meeting, p. 413. (See Amer. Jour. Ophth., 1936, v. 19, Feb., p. 152.)

Schoenberg, M. J. **A binocular microscope for delicate surgery.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 401-403.

By combining binocular microscope and a hand slitlamp the author has constructed an apparatus which can be used to examine the various tissues of the eyeball exposed during operation. It enables the surgeon to see clearly the minute details of each step and assists in diagnosis. It will be valuable for physiologists and those interested in experimental surgery. C. Allen Dickey.

Yanes, T. R. **The use of gloves in eye surgery.** Rev. Cubana de Oto-Neuro-Oft., 1935, v. 4, Sept.-Dec., p. 126.

Gloves have been found by the writer safe, advantageous, and not inconvenient. M. Davidson.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Albers, E. C., and Sheard, C. **The tolerance of light in nonphotophobic individuals.** Amer. Jour. Ophth., 1936, v. 19, May, pp. 407-412.

Castelao, M. A., and Rivas, J. de la T. **Fuchs's black spot in myopia.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Dec., pp. 617-625.

After a brief discussion of symptomatology, etiology, and pathogenesis, the authors report ten cases found among 228 myopic patients. Twelve photographs taken by the infrared method of Diaz Caneja illustrate the article. The authors believe the lesion to be myopic, due to proliferation of glial tissue. Neither sex nor age has any influence in causing the disease. It may appear in either eye, and seems to have certain preference for myopia of medium degree. The work was done in Diaz Caneja's clinic at the Casa de Salud Baldecilla Santander. (Bibliography, 12 illustrations.) R. Castroviejo.

Emerson, Linn. **An unusual case of myopia.** Amer. Jour. Ophth., 1936, v. 19, May, p. 419.

Fincham, E. F. **A study of accommodation by photography of the living lens and ciliary body in a case of aniridia.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 145.

The mechanism of accommodation was studied in a 22-year-old patient, whose right iris had been lost in an accident in which the eye was cut at the limbus on the nasal side. This was the only defect in the eye other than absence of the iris. Photography was used to study the alterations in the sagittal and equatorial dimensions of the lens and in the form and position of the lens surfaces, and the movements of the ciliary body. There seemed to be evidence that reduction of tension upon the lens during accommodation was due to the centripetal movement of the ciliary body. In the slitlamp photographs the ciliary body moved inward during accommodation by more than the amount of movement of the equator of the lens. This is attributed to the elasticity of the zonule.

Beulah Cushman.

Friedman, S. I. **Relation between the angle gamma, asthenopia, and astigmatism.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 110.

Study of one hundred cases showed that the prevalent opinion relative to greater frequency of astigmatism with the rule is incorrect and needs revision; that astigmatism against the rule is more frequent in cases of asthenopia; that the average size of the angle gamma is greater in astigmatism against the rule than in astigmatism with the rule; and that small amounts of astigmatism against the rule may cause asthenopia and should be corrected.

Ray K. Daily.

Jafe, Z. **Physiologic norms of acuity of depth perception in the young with normal vision.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 142.

Litinskii's stereomyograph tests quantitatively depth perception for far and near in vertical and horizontal positions of the object. It also tests muscle balance, and the ranges of accommodation and convergence under standard illumination. Jafe presents a tabulated study of the relation of depth perception to muscle balance for various ages. He considers such determinations important for vocational guidance.

Ray K. Daily.

Jalin, M. I. **Stability of stereoscopic color mixtures.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 150.

The author tested his own stability, using the Zeiss stereoscope and two pieces of paper colored with primary spectral colors. He concludes that the retinal impression of the abstract color mixture is very unstable, and that the impression of a mixed color increases in stability with the addition of factors stimulating attention, such as using differently colored objects.

Ray K. Daily.

Kayser, B. **Acquired progressive myopia of 20 D.** Klin. M. f. Augenh., 1936, v. 96, March, p. 369.

A perfectly healthy man of 39 years did not require spectacles when enlisted in the army in 1916, so that he must have been entirely or approximately emmetropic. In 1917 he received a shot in the head, without involvement of the eyes. After the war he noticed an impairment of sight, and in 1929 he had myopia of 11 D. with black foci and small hemorrhages at the maculae. In 1936 his myopia had increased to 20 D., with a large central scotoma. At the macula was a great black pigment patch, surrounded by large white foci, but with no sharply defined ectasia. It is assumed that a severe pathologic process with hemorrhages softened the posterior wall of the globe, so that it yielded to intraocular pressure.

C. Zimmermann.

Luzsinskii, G. F. **The effect of miotics on the retina and on accommodation.** Sovietskii Viestnik Opht. 1936 v. 8, pt. 2, p. 183.

This study was planned to review Hess's contention that miotics are in-

jurious to the fovea, but the tabulated results fail to do so, and the author concludes that the visual variations following the use of miotics are due entirely to the effect on accommodation.

Ray K. Daily.

Marquez, M. **The correction of myopia by convex lenses.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 137.

The myopic eye is capable of correction by a system of convex lenses which, in contrast to what occurs with concave lenses, actually increase the size of the image. With the "pair of inversion" as in the astronomic telescope, the image appears upright as well as magnified, but the apparatus has the inconvenience of being too long. By using Porro's second class prism, the image is upright, magnified, and the apparatus of moderate length and weight, so as to be of practical value. Marquez has used his apparatus in myopia as high as 33 D., but it can be also employed in lower grades by adding a convex supplement. He reports good results both for distance and near, especially for reading.

Beulah Cushman and
M. Uribe Troncoso.

Marshall, D. **Changes in refraction following operation for strabismus.** Trans. Amer. Acad. Ophth. and Otolaryng., 1935, 40th annual meeting, p. 205. (See Section 4, Ocular movements.)

Polacco, A. **Stellar vision.** Ann. di Ottal., 1936, v. 64, Feb., p. 81.

It is to astronomy that we owe our earliest determination of the limits of visual acuity in the ability to distinguish between stars of minor magnitudes. The author in an earlier publication had set forth the principle that, to obtain a faithful photographic reproduction of an object in space, the objective must have such chromatic and spherical aberrations as occur in the human eye.

Gullstrand had conceived the possibility of an instrument designed to demonstrate his theory of "Faltenbildung" or folds in the lens produced by varying degrees of zonular tension causing the phenomenon of "stellar vision." Thus the rays we see around a luminous point, such as a fixed star, would not be due to the irregular astigmatism of the lens but would represent a form of regular aberration.

By means of bicylindrical lenses of Gullstrand and an objective of his own design, the author produces the "gutta nigra" and the "shaded sector." He attributes each of these phenomena to stellar vision, or "asterism" as he prefers to call it, of the human eye.

"Gutta nigra" is an astronomical phenomenon. In the transit of a planet, when the dark shadows of the planet after passing through the bright area of the sun reach the blackness of the sky, at the moment of contact instead of two clearly defined edges a point appears at the center of the curves as they are about to touch. This is the "black drop" or "gutta nigra." Park Lewis.

Samoilov, A. I. **The significance and diagnosis of color asthenopia.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 3.

This condition, which consists in development of a disturbance in color vision after ocular fatigue in an eye which was previously tested and found normal, can be diagnosed only with the Nagel anomaloscope. The author points to the importance of excluding persons subject to such asthenopia from occupations requiring accurate color perception.

Ray K. Daily.

Scheglova, A. A. **The effect of refractive errors on the functional activity of school children's eyes.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 272.

This tabulated study shows that the visual acuity and range of accommodation in emmetropes rises for four or five school periods, and then begins to fall. Under the same conditions hypermetropes and myopes show an insignificant rise in these visual functions for two or three school periods, and the decrease begins earlier and is more pronounced. Ray K. Daily.

Schmidt, Ingeborg. **Investigations on the usefulness of Ishihara's plates for**

differential diagnosis of disturbances of the color sense. Klin. M. f. Augenh., 1936, v. 96, March, p. 289.

Since 1930, at the instance of Trendelenburg, during tests of color sense at the physiologic laboratory of the University of Berlin, the author has investigated whether readings of Ishihara tests permit more exact diagnosis of disturbance of color sense than indicated in the directions for their use. No absolutely sharp border between color efficiency and inefficiency can be drawn with this method. Conclusions as to the characteristics of a color system can never be reached with absolute surety, but only surmised with great probability. For exact differential diagnosis the spectral methods of examination must always be resorted to.

C. Zimmermann.

Silber, D. A. **Functional test in a study of ocular fatigue.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 130.

In this preliminary report the author proposes the use of a functional effort to bring out the ocular changes produced by work requiring relatively moderate visual exertion. Such an effort, which consists in checking against a scale four rows of Landolt's rings for five minutes, is comparable to a running walk in testing cardiac efficiency.

Ray K. Daily.

Smaltino, M. **Effect of thickness of the cornea and of the crystalline lens on the total refraction of the eye.** Ann. di Ottal., 1936, v. 64, Feb., p. 109.

Researches with Gullstrand's schematic eye lead to the conclusion that varying thickness of the cornea exercises no appreciable effect on the dioptric power of the eye and that so little focal change is caused by difference in thickness of the lens as to exclude the existence of a spherical ametropia clinically determinable and due exclusively to a variation in lens thickness from the mean physiologic value. A difference of 2.6 mm. was required to effect a change of one diopter in the refraction of the eye.

Park Lewis.

4. OCULAR MOVEMENTS

Bushmitsch, D. G. **The etiology of enophthalmos and retraction movements of the eyeball.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 43. (See Section 13, Eyeball and orbit.)

Denig, Rudolf. **The performance of my advancement operation.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 177.

After detaching the conjunctiva at the corneal margin and undermining it to and over the insertion of the tendon, the latter is exposed, leaving the muscle in connection with its sheath and Tenon's capsule. With a slender lance-shaped knife a minute paracentesis of the anterior chamber is made at the limbus below or above the horizontal meridian, as preparatory passage for the needle, this opening being so small that no aqueous can escape. The needle is carried through this paracentesis canal into the anterior chamber and out through the limbus. Both needles of the doubly-armed white-silk suture pierce the muscle from within outward behind the squint hook and are tied after cutting the insertion of the tendon. The conjunctiva is not included in the suture. Denig operated on over four hundred cases by this method, to his full satisfaction. (Illustrations.)

C. Zimmermann.

Dudinov, O. A. **The use of the auricular cartilage in the surgery of strabismus.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 250.

The operation consists in making a loop in each half of the split muscle and introducing into the loop a piece of auricular cartilage. The size of the cartilage controls the size of the loop and the degree of correction. (Illustrations.)

Ray K. Daily.

Georgariou, P. M. **Alternating convergent strabismus.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 183.

From observations of 280 cases, Georgariou discusses pathogenesis, heredity, time of occurrence, usual course, alternating phenomena, cause of deviation, motility, visual acuity, refraction, and

treatment. He operates at eight to ten years, not later, with slight overcorrection. C. Zimmermann.

Litinskii, G. A. **A study of heterophoria combined with dominance of one eye.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 50.

The tabulated report of 100 tests with the Maddox rod placed before each eye shows that the angle of deviation is greater when the rod is placed before the nondominant eye. This leads the author to urge that in selection of candidates for the aviation service the Maddox rod be placed before the nondominant eye. Ray K. Daily.

Marshall, D. **Changes in refraction following operation for strabismus.** Trans. Amer. Acad. Ophth. and Otolaryng., 1935, 40th annual meeting, p. 205.

The postoperative refractive condition was studied in a group of 55 patients who underwent a total of 62 operations for correction of squint. The author concludes that the refractive state of an eye usually changes as a result of operation upon the extraocular muscles of that eye, and that the changes are more frequent when a lengthening operation is done with or without a simultaneous shortening operation, and when a large deviation occurs. Sixty percent showed a change of 0.50 D. or more in at least one meridian upon discharge from the hospital. The average change among the sixty percent was 0.75 D. The opposite untouched eye may show changes, although less frequently, that is, in 41 percent. Later observations showed that in the great majority of cases the eye tended to return slowly to its preoperative state, but not completely, so that permanent differences usually resulted. One year after operation nine out of ten cases showed such a difference. Refractive changes from muscle-lengthening and shortening operations correspond to the effect the increase or decrease of muscle tension consequent upon surgery would have upon the globe, if such changes are in corneal curvature. Thus the usual change following a recession operation was an increase of vertical refractive power and a decrease of power in the horizontal meridian. Following resection of the lateral recti, the opposite usually occurred. The frequency of changes in both operated and unoperated eyes points to the necessity for frequent postoperative checks of visual acuity, with change of lens whenever indicated. (Tables, discussion.) George H. Stine.

Miranda, A. G. **The diagnosis of diplopia.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 205.

If in an ocular palsy the objective test does not yield a definite result, the diagnosis may be sought by subjective observation of the double images. For this purpose Miranda gives a scheme in the shape of two inclined crosses, one for each eye; but he does not contend that it is sufficient for all cases. (Illustrations.) C. Zimmermann.

Ohm, J. **Contribution to nystagmus.** 38th Communication. **The influence of symmetrical hemianopsia on optokinetic nystagmus.** Graefe's Arch., 1936, v. 135, p. 200.

Of 22 cases of hemianopsia studied, 14 were right-sided and 8 left-sided. In 5 the hemianopsia was caused by injury. In the remainder it occurred suddenly, apparently dependent therefore upon vascular disorders. The optokinetic nystagmus, measured as to frequency, amplitude, and energy, showed diminution in comparison to normal patients. This diminution was greater when the jerk took place toward the affected side, but still occurred, in a less degree than normal, when the jerk was directed toward the sound side. This disturbance in nystagmus is not due to injury of the ascending optic pathway but to a "complication" associated with it. H. D. Lamb.

Peter, L. C. **The diagnosis and differentiation of alternating types of concomitant squint.** Trans. Amer. Ophth. Soc., 1935, v. 33, pp. 39-48.

Alternating squint is divided into two classes, the accidentally alternating and the essentially alternating. These are

differentiated by the following points: age of onset, amblyopia, refraction, anisometropia, and fusion. The author emphasizes the importance of differentiating between these two types of squint before orthoptic training is begun. In the former the results of fusion training are very good while in the latter results are nil, because of the established habit of repression and the total lack of any desire to effect fusion. (Discussion.) C. Allen Dickey.

Sales, Monteiro. **Sensoro-motoroph-thalmoplegia.** Arquivos do Instituto Penido Burnier, 1935, v. 4, Dec., pp. 114-121.

The patient had a complete ophthalmoplegia of syphilitic origin, demonstrated by examination of the blood and spinal fluid. Radiography of the optic foramina was negative. Treatment with arsenic and bismuth led to complete disappearance of headache, improvement as to the paralyses, and return of vision to normal. W. H. Crisp.

White, J. W. **Congenital paralysis of the sixth nerve.** Trans. Amer. Acad. Ophth. and Otolaryng., 1935, 40th annual meeting, p. 193.

The author calls attention to the conditions for which paralyses of the sixth nerve are most commonly mistaken, namely, a large powerful internus with a normal externus, a strabismus fixus, and a retraction syndrome. In the first two conditions especially, it is often impossible to make a definite diagnosis until the muscles in question are explored and studied. In definite cases of parlysis the writer prefers to advance the affected muscle to obtain all possible mechanical help, supplemented by recession of the direct antagonist of the same eye to minimize secondary contracture. With the operation of transplanting slips of the superior and inferior recti to the tendon of the affected externus the author has had no experience, but he is of the opinion that recession or tenotomy of the internus done in this operation may be a large factor in the results obtained. (Five case reports, discussion.)
George H. Stine.

5. CONJUNCTIVA

Artemiev, N. I. **Etiology and pathogenesis of follicular conjunctivitis in school children.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 36.

From a statistical study the author concludes that follicular conjunctivitis has a tuberculous basis, and that the presence of adenoids and errors of refraction have no significance in this disease. Ray K. Daily.

Burnier, P., and Sales, M. **Primary tuberculosis of the conjunctiva.** Arquivos do Instituto Penido Burnier, 1935, v. 4, Dec., pp. 122-126.

The patient was a girl of twelve years. There was swelling of the preauricular and submaxillary glands. There were exuberant grayish granulations in the lower cul-de-sac, and the upper cul-de-sac had smaller granulations like those of trachoma. Tubercle bacilli were found in the granuloma, and animal inoculation was positive. There were no other tuberculous foci.
W. H. Crisp.

Castroviejo, Ramon, Sr. **A new case of fibrous conjunctivitis.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Dec., pp. 634-641.

The author reports a case of chronic conjunctivitis with marked blepharophimosis and formation of pseudomembranes. A hardened mass removed from the eyelids was found to be inflammatory tissue. Bacteriologic examination detected some diplobacilli and scanty staphylococci. Neither surgery nor treatment with antiseptics was effective in stopping the disease. The induration of the eyelids as well as the formation of the pseudomembranes progressed, and the cornea began to become opaque. The author reviews briefly similar cases reported in the literature, and arrives at the conclusion that in this inflammatory condition of unknown etiology it is better not to resort to surgery because it only leads to formation of more pseudotumors and pseudomembranes, and subsequently develops more cicatricial contraction of tissues. (Bibliography. One illustration.) R. Castroviejo.

Charamis, J. **Treatment of trachoma with bee virus.** Rev. Internat. du Trachome, 1936, v. 13, Jan., pp. 27-34.

The author reviews previous work. Brecher has isolated a new fraction of the virus (trachocide) that can be injected without pain or other complications. Treatment with this, when combined with other methods (copper, silver nitrate, and so on) results in rapid formation of soft scars. It is particularly valuable in treatment of corneal complications. The toxin is injected into the tarsus, the superior cul-de-sac, the tarsal conjunctiva, and medial to the lacrimal gland. Occasionally an injection is made into the bulbar conjunctiva. The course of treatment consists of two or three injections a week for four weeks. In treating pannus more frequent injections are made in the region of the upper limbus.

P. J. Leinfelder.

Derkač, V. **Scarring and flattening of the lacus lacrimalis in trachoma.** Graefe's Arch., 1936, v. 135, p. 169.

In advanced cicatricial trachoma the lacus may form a flattened stiff triangle with rounded angles. The caruncle is retracted and generally not perceptible. The lacus is advanced to the level of the posterior margins of the eyelids at the internal canthus. It has a dull dry appearance and a dirty white color. On separating the eyelids here, one meets with much resistance and the patient experiences pain. H. D. Lamb.

Essen-Möller, Lars. **Unilateral hemorrhagic lymphangiectasis of the conjunctiva with zonular cataract.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1934-1935, pp. 58-61. In Hospitalstidende, 1935, Dec. 17.

These two conditions were found in the right eye of a girl of seven years. The left eye was normal. Since it has been shown experimentally that a zonular cataract can be produced in rabbits by ligating the venae verticosae, that is, by producing a marked disturbance of the circulation, it can be assumed that the cataract in this case came about in a similar manner.

D. L. Tilderquist.

Hamburger, F. A. **Acute conjunctivitis caused by micrococcus catarrhalis.** Graefe's Arch., 1936, v. 135, p. 277.

A man of 31 years had mild swelling and redness of the palpebral conjunctiva, a delicate papillary hypertrophy, a very fine removable membrane, a small amount of purulent secretion, and an enlarged and somewhat painful preauricular gland. On the first day of appearance of the inflammation, groups of gonococcus-like germs, many of them single, were observed in the living epithelial cells of the bulbar conjunctiva. The true nature of the organism was demonstrated by cultures and fermentation tests. H. D. Lamb.

Harrison, R. W. **The specificity of the conjunctival infection in monkeys following inoculation with trachomatous tissue.** Jour. of Infectious Dis., 1935, v. 56, Jan.-Feb., p. 49.

Experiments were undertaken to determine whether the follicles occurring in monkeys after inoculation with trachomatous material were due to a specific agent present in trachoma or to a nonspecific irritation. Mechanical and chemical irritation failed to induce folliculosis. Repeated inoculations with bacteria and protein solutions did not cause development of follicles. Inoculation with tissue from cases of acute conjunctivitis, spontaneous folliculosis, and inactive trachoma failed to elicit a follicular response in monkeys. In animals recovered from infection with trachomatous tissue, follicular hypertrophy was induced only by reinoculation with trachoma material. Monkeys which did not react to nonspecific stimuli later developed typical follicles when inoculated with active trachoma material. The evidence indicates that occurrence of follicles in monkeys following inoculation with material from human trachoma is specific of trachoma. Edna M. Reynolds.

Julianelle, L. A., and Harrison, R. W. **Studies on the infectivity of trachoma.** Trans. Amer. Acad. Ophth. and Otolaryng., 1935, 40th annual meeting, p. 221.

Of ten complete experiments in

which trachomatous material was studied by testicular passage, two were originally infectious for monkeys. After testicular passage, the same two materials were infectious in greater degree than originally, while the eight specimens noninfectious in the beginning remained noninfectious after testicular passage. It seems therefore that testicular passage does not allow recovery of the agent unless the trachomatous agent is present originally. When the agent is present in human tissue it is recoverable by testicular passage in greater potency and in a purified condition. A few preliminary experiments in filtration of the infected trachomatous testicular tissues both by Berkefeld and Elford filters, and in concentration of the trachomatous agent by cataphoresis of the infected testicle, were unsatisfactory and inconclusive, and further study is deemed necessary to determine the validity of the above findings. (Discussion.) George H. Stine.

Krachmalnikov, L. L. **Treatment of trachoma by repeated massage with the Desmarres lid elevator.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 106.

In the acute stages the author gets satisfactory results from expression of the follicles with the Desmarres lid elevator, repeated every ten to fifteen days. The procedure is effective in the second and third stages of trachoma, destroying the follicles and diminishing the infiltration of conjunctiva and cartilage. Ray K. Daily.

Lobel, A. **My experiences in treatment of trachoma with trachocid.** Klin. M. f. Augenh., 1936, v. 96, March, p. 374.

Eleven cases of trachoma with more or less severe complications of the cornea were treated with subconjunctival injections of trachocid into the lids and eyeball every other day. Generally from ten to fifteen injections sufficed. Trachocid proved to be a very reliable and especially efficient remedy, which may lead trachoma therapy into new biologic paths. It does not irritate, and it is painless. C. Zimmermann.

MacCallan. **The surgery and pathology of trachomatous conjunctivis.** Rev. Internat. du Trachome, 1936, v. 13, Jan., pp. 1-10.

This is the Hunterian lecture delivered before the Royal College of Surgeons. The pathology of trachoma consists of a subepithelial infiltrate that is not invariably follicular. The bleblike excrescences often referred to as follicles are really strangulated meibomian ducts. The process is a progressive chronic inflammation that involves the adjacent structures (cornea, tarsus, and cul-de-sac). Extension of the end capillary loops, infiltration of the cornea, and scarring are important clinical and pathologic processes. A résumé of the author's classification of stages of trachoma is given. In treatment of deformities due to scars the author advises against epilation, clamping of the lid, removal of skin, and several specific operations. Prophylaxis remains the most important means in control of the disease. P. J. Leinfelder.

Marin Amat, M. **Mercurochrome in blennorrhea neonatorum.** Rev. Cubana de Oto-Neuro-Oft., 1935, v. 4, Sept.-Dec., p. 108.

Two cases of gonorrheal ophthalmia and one case of inclusion conjunctivitis in the new-born made complete recovery in eight to nine days under treatment with mercurochrome four percent, which is considered superior to treatment with silver nitrate. A two-percent mercurochrome solution is inadequate. M. Davidson.

Meighan, S. S., and Urquhart, M. **An investigation into the question of the presence of Bacterium granulosis (Noguchi) in cases of trachoma in Glasgow.** Brit. Jour. Ophth., 1936, v. 20, April, p. 201.

The investigation was conducted with a series of 25 cases from the trachoma wards at Stobhill Hospital. No growth occurred in five cases. These were from the earlier part of the series and growth was presumably interfered with by use of cocaine. Thirteen cases presented the cultural characteristics of

B. granulosis except that they did not ferment glucose. In the remaining seven cases B. granulosis was isolated. In three it was Noguchi's typical, and in four resembled his atypical forms.

D. F. Harbridge.

Möller, H. U., and Blegvad, O. **Artificial membranous conjunctivitis.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1934-1935, pp. 21-32, In Hospitalstidende, 1935, Dec. 17.

Self-inflicted conjunctivitis is of rare occurrence. Five cases are reported, all in women who sooner or later showed hysterical tendencies. Characteristic is a marked conjunctivitis of long duration varying greatly in intensity, limited to the conjunctiva of the lower lid and lower half of the eyeball (which is easiest of approach) and limited to one eye. The clinical appearance does not fit any other known disease; the conjunctiva is greatly swollen, often to the extent of protruding between the lids; and is covered with a grayish membrane resembling that of diphtheria. The irritant used was in one case a proprietary toilet article, in another mechanical scratching with the finger nails. In the other three it was unknown. Rapid improvement always occurs when an effective occlusion bandage is applied.

D. L. Tilderquist.

Posthumus, R. G. **Some remarks on the significance of phlyctens.** Klin. M. f. Augenh., 1936, v. 96, March, p. 362.

The author gives a survey of the different affections of the conjunctiva and cornea in which he considers an allergic etiology. He refers to a probable connection with endocrine disturbances and related phenomena of the autonomous nervous system. Eight cases of rosacea are mentioned, of which only two were without ocular affections, and some had choroiditis and iridocyclitis, so that one had to think of tuberculosis. The difference between true allergic conjunctivitis on the one hand and scrofulosis and rosacea on the other is emphasized, with the assumption of allergy to tuberculosis antigen in the two latter.

C. Zimmermann.

Pulvertaft. **Nature of so-called follicles in second stage of trachoma (IIa).** Rev. Internat. du Trachome, 1936, v. 13, Jan., pp. 19-23.

The histology of trachoma conforms with that of many chronic subepithelial inflammations in which there are proliferation of epithelium and increased vascularity of subepithelial tissue with infiltration of lymphocytes and plasma cells. The author has studied pathologic material obtained from Wilson and Stewart at the Giza Memorial Ophthalmic Laboratory in Egypt, and he arrives at the conclusion that the follicles do not become necrotic and are inexpressible. Cysts of meibomian glands form, and it is these which are ruptured by mechanical means.

P. J. Leinfelder.

Rodstein, C. D. **Examination of the conjunctival sac with cotton-tipped applicators, particularly in group examinations, and their use in conjunction with other practical antitrachomatous measures.** Sovietskii Viestnik Opht., v. 8, pt. 2, p. 235.

The author urges that the lids be manipulated by means of two cotton-wound applicators, thus avoiding contact with the fingers and the need for washing and disinfection. He describes in detail the manipulations for examination, massage, expression of follicles, and medicinal applications.

Ray K. Daily.

Sales, Monteiro. **Bacterioscopy of conjunctivitis.** Arquivos do Instituto Penido Burnier, 1935, v. 4, Dec., pp. 80-100.

Out of 756 microscopic examinations in the clinic, 86.7 percent gave positive results. The bacillus of Koch-Weeks was most frequent, followed by xerosis bacillus, staphylococcus, Morax-Axenfeld diplobacillus, and the pneumococcus. The author discusses the question of the influence of temperature conditions upon the appearance of various

organisms, but does not arrive at a definite conclusion. W. H. Crisp.

Sédan, Jean. **Two cases of familial infection with trachoma after the conjunctivitis of measles.** Rev. Internat. du Trachome, 1936, v. 13, Jan., pp. 48-50.

Two children living with a trachomatous family, in which five members were affected, escaped infection for six and five years respectively, but quickly showed signs of the disease after an attack of measles.

P. J. Leinfelder.

Tang, F. F., and Chou, C. H. **Studies on the relation of Bacterium granulosis to trachoma.** Jour. of Infectious Dis., 1935, v. 56, May-June, p. 264.

Attempts to isolate Bacterium granulosis from 179 cases of classical trachoma were negative and attempts to induce trachoma in rhesus monkeys and in man by experimental inoculation with cultures of Bacterium granulosis were also negative. Follicular hypertrophy of the conjunctiva was induced in two out of nine monkeys which were injected with human trachomatous material.

Bacterium granulosis could not be isolated at any time from either of these animals. Edna M. Reynolds.

Trapezontzeva, E. **Trachoma and Bacterium granulosis Noguchi.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 231.

A report of two old cases in which the bacillus was isolated.

Ray K. Daily.

6. CORNEA AND SCLERA

Castresana, Angel. **Congenital anomalies of the sclera.** Rev. Cubana de Oto-Neuro-Oft., 1935, v. 4, Sept.-Dec., p. 112.

Congenital anomalies are reviewed under two groups: (1) the congenital pigmentations seen with slitlamp and microscope as ochre-colored semilunar fringes around the scleral perforations of the anterior ciliary vessels, and the rarer melanotic patches without tendency to malignancy; (2) blue scleras, associated with fragility of bones and otosclerosis. The treatment for the latter is general only: remineralization, opotherapy, antiluetic, and so on.

M. Davidson.

Colomba, Nicolo. **Clinical researches on choroidal complications of parenchymatous keratitis.** Ann. di Ottal., 1936, v. 64, Jan., p. 1.

The author examined 29 persons, all of whom had previously had parenchymatous keratitis. The pupils were widely dilated and both central acuity and peripheral vision accurately determined. Small atrophic and pigmented patches were discovered in the extreme peripheral zone but in every instance the central zone had been wholly spared. (Bibliography.)

Park Lewis.

Dering, S. A. **Observations on familial corneal dystrophy.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 215.

From a report of seven cases in three families, the conclusions are that corneal dystrophy is a dominant hereditary disease, not sex-linked; that the term "hereditary" should be substituted for the term "familial"; and that it appears at puberty and in the first years of adolescence. The occasional periods of ocular irritation are due to the increased susceptibility of the changed epithelium and not to the remissive course of the disease. The opacities represent a transparent homogeneous substance with an index of refraction different from that of the cornea.

Ray K. Daily.

Derkač, V. **Keratomalacia in adults as precursor of death.** Klin. M. f. Augenh., 1936, v. 96, March, p. 380.

An otherwise healthy robust farmer of 66 years had an atypical serpent ulcer of the pannous cornea of his only eye, and after its subsidence incipient xerosis developed. Three days before death violent malignant keratomalacia set in, with entire loss of the cornea within three days. There was no cachexia. Perhaps the acute cardiac insufficiency due to atheromatosis was the cause of death. C. Zimmermann.

Filatov, V. P. **On the technique of corneal transplantation.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 159.

A description of a new modification of the Filatov-Marzenkovski trephine. (Illustrations.) Ray K. Daily.

Filatov, V. P., and Schmoulian, L. P. **The most recent contributions to the question of transplantation of the cadaveric cornea.** Arch. di Ottal., 1936, Jan.-Feb., v. 43, p. 57.

The total number of partial corneal transplantations performed from 1923 to 1935, in the ophthalmologic clinic of the Medical Institute of Odessa, was 205. Among these, only 96 operations with complete observations have been published, and 48 operations in this series were performed on cases with complications such as glaucoma, ectatic leucoma, staphyloma, and buphthalmos. Of 48 operations on eyes without complications, 14, or 29 percent, showed favorable results. The period of observation in 13 cases was not less than one year and usually between two and a half and three and a half years.

Filatov utilized cornea from eyes enucleated from cadavers and preserved at a temperature of 4 to 6°C., the material being (a) from patients who died in hospitals and were known to be free from infection, (b) after traumatic deaths, and (c) from cadavers known to have histories which would not contraindicate transplantation. Cases of transplantation from eyes enucleated from cadavers two to five hours after death and preserved two to fifty-five hours before use demonstrate that coalescence of the cadaveric transplant is effected with the same frequency as from living material, and that during the postoperative period the cadaveric transplant behaves like living material.

Herman D. Scarney.

Handmann, Martin. **Spontaneous round depressions of the episclera and conjunctiva at the upper limbus.** Klin. M. f. Augenh., 1936, v. 96, March, p. 316.

Handmann describes single round depressions, 3 mm. in diameter and about 1 mm. deep, in the vertical meridian above the upper limbus in one eye of each of two young men and in both eyes of a man of 48 years, without other ocular affections. He attributes these to congenital disturbance of development. (Illustrations.)

C. Zimmermann.

Ješe, L. **Nummular keratitis.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 219.

In the past three years Ješe has observed increasing occurrence of nummular keratitis, mostly in farmers. It consists of round, superficial, greyish-white, later yellowish, foci in the cornea of different sizes, composed of closely crowded dots arranged in groups and terminating in facets. The long duration, multiplicity of foci, superficial situation, and slight participation of the conjunctiva are characteristic. Some were complicated by superficial vascularization, four by precipitation, and one by iritis. From the clinical standpoint the condition is etiologically related to corneal herpes. Treatment was symptomatic. (Illustrations.)

C. Zimmermann.

Kirwan, E. O'G. **Corneal transplantation on opaque corneas.** Indian Med. Gaz., 1935, v. 70, Feb., p. 61.

Two cases of successful corneal transplantation with partial penetrating grafts are reported and the details of operative technique are given.

Edna M. Reynolds.

Korsheniantz, C. F. **Furrow keratitis and peripheral ectasia of cornea and sclera.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 246.

A girl of fifteen years, with a history of traumatism and iridectomy in the left eye in early childhood, came with a narrow furrow in the cornea, up and out, and an adjacent ectasia of the cornea and sclera. The author attributes the ectasia to weakening of the ocular walls, due to the injury, combined with the strain of hard labor.

Ray K. Daily.

Linksz, A. **A new way of treating parenchymatous keratitis from congen-**

ital lues (Schieck's intraocular autohemotherapy.) Klin. M. f. Augenh., 1936, v. 96, Feb., p. 233.

In seven such cases Linksz obtained remarkably rapid and practically perfect clearing of opaque cornea.

C. Zimmermann.

Melik-Musian, B. H., and Mesropian, E. I. **Malarial keratitis.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 81.

Twenty-one cases of malarial keratitis lead the authors to conclude that the disease is more frequent than one might judge by the literature; that the type of involvement may be superficial or parenchymatous in type; and that therapeutic measures are ineffective, and recovery is to be attributed to the recuperative powers of the organism.

Ray K. Daily.

Mizkevich, D. L. **Surgery of trachomatous pannus.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 101.

A discussion of the surgical procedures used in pannus.

Ray K. Daily.

Nizsetich, Z. **Comments on the technique of partial corneal transplantation.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 166.

A knife, here described, is introduced into the anterior chamber and held there while the cornea is trephined. It is so constructed that it prevents escape of aqueous and protects the lens. (Illustrations.) Ray K. Daily.

Pajtas, Jozo. **Corneal herpes.** Bratislavske Lekarske Listy, 1936, v. 16, Feb., pp. 49-59.

Of 165 cases, 70.91 percent were in the male sex. The disease was much more frequent in girls than in boys (in the proportion of thirteen to two). It was most frequently encountered between the ages of twenty-five and thirty years. Three-fourths of all the patients had had either febrile disorders of long duration, acute febrile disorders, or affections which had been treated with remedies capable of provoking herpetic eruptions. The author blames the malady on an allergic condition of the organism, of slow development.

W. H. Crisp.

Pajtas, Jozo. **Traumatic corneal herpes.** Bratislavske Lekarske Listy, 1936, v. 16, March, pp. 141-144.

The author describes a case in which a claim for industrial indemnity was based upon alleged traumatic herpes. He does not concede such an etiology.

W. H. Crisp.

Petrunia, S. P. **Prophylaxis and treatment of serpiginous corneal ulcers.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 96.

Studying the subject from a social viewpoint, the author concludes that diminution in the incidence of the disease is due to industrialization of agriculture; that avoidance of the disease calls for vocational selection in agriculture, for introduction of protective spectacles, and for propaganda. For conservation of vision in serpiginous ulcer it is necessary to establish a special system for rapid transport of patients from state farms to hospitals. Therapeutically, trephining the ulcer is the most effective measure for conservation of the eyeball and vision. Ray K. Daily.

Rameev, R. C. **Treatment of corneal ulcers with silvered preparations.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 92.

The author urges a wider use of "silvered water and powder." The preparations are entirely harmless and very effective in purulent ulcers of the cornea. Ray K. Daily.

Saburov, G. I. **Roentgenotherapy of scleritis and sclerokeratitis.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 59.

The author tabulates 21 cases thus treated. He holds that X-ray therapy is beneficial in tuberculous episcleritis and is injurious in the rheumatic type.

Ray K. Daily.

Stocker, F. **Superficial keratitis and vitamin A.** Schweiz. med. Woch., 1936, no. 14, April 4, p. 335.

The author reports three cases of superficial punctate keratitis which were cured rapidly by administration of vitamin A. Theodore M. Shapira.

Trubin, Anatole. **Diagnostic value of inactive pannus.** Rev. Internat. du Trachome, 1936, v. 13, Jan., pp. 34-40.

Often close observation of the limbus with ophthalmoscope or loupe and focal illumination will disclose inactive pannus and clarify an otherwise dubious case. Three cases are described.
P. J. Leinfelder.

Vinaver, L. C. **Treatment of purulent corneal ulcers.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 94.

The author uses daily subconjunctival injections of five percent dionin with excellent results.
Ray K. Daily.

Wright, R. E. **Interstitial degeneration of the cornea.** Amer. Jour. Ophth., 1936, v. 19, May, pp. 413-417.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Archangelskii, V. H. **The nervous component in the etiology of postoperative cyclitis.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 1, p. 10.

Anatomic study of several eyes enucleated because of low-grade postoperative cyclitis failed to show the characteristic histopathology of cyclitis. The author attributes the clinical symptoms to improper coaptation in the wound and inclusion of the iris, with a forward pull on the ciliary body and stretching of the ciliary nerves. According to him the improvement which frequently takes place after removal of diseased teeth is due, not to removal of a focal hematogenous infection, but to the trophic effect on the eye produced by interruption of a chronic irritation in the fifth nerve caused by the dental infection. (Photomicrographs.)
Ray K. Daily.

Archangelskii, P. F. **Treatment of sympathetic ophthalmia by blood transfusion.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 169.

A report of two cases of sympathetic ophthalmia with increased tension, which after failure to respond to various therapeutic procedures recovered with a satisfactory visual result upon blood transfusion. Ray K. Daily.

Baratta, O. **Research and amount of oxalic acid in the aqueous.** Arch. di Ottal., Jan.-Feb., 1936, v. 43, p. 44.

Determination of the presence of oxalic acid was made in the aqueous of horses, donkeys, lambs, calves, oxen, and beeves. The highest amount was found in the aqueous of lambs and the lowest in that of donkeys. The presence of oxalic acid in the human aqueous was verified but the amount not determined.
Herman D. Scarney.

Biozzi, Giuseppe. **Observations and researches on Fuchs's heterochromia.** Boll. d'Ocul., 1936, v. 15, Jan., pp. 67-144.

The writer gives the clinical history of twenty patients aged from 18 to 43 years (eleven of whom were males) giving symptoms of this anomaly. On the basis of biomicroscopic findings in cornea, aqueous, iris, lens, and vitreous, and of systemic examinations, he comes to the conclusion that the eye affection is due to serous iridocyclitis of slow course, fifty percent of the cases being of definitely tuberculous and others of suspected tuberculous origin. (Bibliography, 9 figures.) M. Lombardo.

Koenig, I. J. **The treatment of ocular infections with gold sodium thiosulphate.** New York State Jour. Med., 1935, v. 35, Oct. 15, p. 1019.

The author cites several cases of nontuberculous uveitis, which were definitely benefited by gold sodium thiosulphate. Routinely, he starts with a dose of 10 mg. and increases this to 25 mg. for a total of six weekly doses. At the end of the sixth treatment the dose is increased to 50 mg. until fifteen doses in all have been given. After one month of rest the 50 mg. dose is again given, if necessary, for fifteen doses. If there is no improvement the therapy is discontinued. Theodore M. Shapira.

Moron, D. José. **A case of metastatic iritis.** Arch. de Oft. Hisp.-Amer., 1936, v. 36, Jan., pp. 37-42.

After the removal of two infected teeth, purulent iritis with marked diminution of vision and slight septicemia recovered rapidly without sequelae. R. Castroviejo.

Motolese, Francesco. **A rare case of sympathetic ophthalmia.** Boll. d'Ocul., 1935, v. 14, Dec., pp. 1619-1627.

In a man of twenty years, ten weeks after a perforating wound of the right eyeball through the ciliary body, symptoms of anterior uveitis and intense optic neuritis occurred. While under treatment the patient developed angina from staphylococcus aureus, with high temperature for about a week. During this time the inflammatory eye symptoms subsided. Nine months later the patient could only count fingers with the left eye but the primary eye showed normal vision and no sign of the previous inflammation. The author emphasizes the influence of the high fever on the sympathetic process.

M. Lombardo.

Rieth, H. **Supplement to Arnold's article on progressive atrophy of the iris with formation of gaps** (see Klin. M. f. Augenh., 1923, v. 71, p. 723). Klin. M. f. Augenh., 1936, v. 96, March, p. 349.

A woman of 26 years showed incipient atrophy of the iris and hypertension without apparent cause. At the age of 29 years inflammatory glaucoma set in with gradual amaurosis. Ten years after onset of the disease phthisis bulbi developed. (Illustrations.)

C. Zimmermann.

8. GLAUCOMA AND OCULAR TENSION

Basile, G. B. **Effects of roentgen therapy on hemorrhagic glaucoma.** Boll. d'Ocul., 1936, v. 15, March, pp. 380-401.

The writer reports the history of eleven cases of hemorrhagic glaucoma in arteriosclerotic patients between 36 and 76 years of age, all treated with X rays. The following conclusions are reached. Small and medium doses of filtered X rays usually stop, or effect absorption of, hemorrhage from the retina. In the majority of the cases the pain ceased after the first irradiations independently of the tension, which went down a few millimeters in some and in others went to normal, so that enucleation was avoided. (Bibliography.) M. Lombardo.

Brecher, L. **A new modification of cyclodialysis.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 235.

The purpose of cyclodialysis is to establish a permanent filtrating cleft between anterior chamber and suprachoroidal space. In the present method this is often frustrated by reattachment of the ciliary body to the sclera. Brecher introduces a piece of prepared membrana testacea, the inner lining of the egg shell, into the suprachoroidal space, letting the end project from the scleral canal and sewing the conjunctiva over it. In a case of glaucoma here reported this procedure proved very satisfactory. C. Zimmermann.

Chajutin, S. M. **Gravidan in treatment of cataract and glaucoma.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 174. (See Section 9, Crystalline lens.)

Fiore, Tito. **Researches on the action of urea derivatives on the permeability of the hemato-ocular barrier.** Boll. d'Ocul., 1935, v. 14, Dec., pp. 1687-1692.

In tabulated form the writer gives the result in rabbits of the action of methylurea, dimethylurea, veronal, and luminal, on the hemato-ocular barrier. (Bibliography.) M. Lombardo.

Krause, J. **Closure of vessels and glaucoma.** Graefe's Arch., 1936, v. 135, p. 173.

Of 31 eyes, 20 were removed because of absolute glaucoma. The remaining 11 presented entirely normal conditions in the central vessels. Of the 20 eyes enucleated, 3 were negative and 16 showed closure of the central vessels. Among the 16 positive cases, 3 had secondary glaucoma after old perforating injury and 2 secondary glaucoma after

choroidal sarcoma. True thrombosis was never encountered. H. D. Lamb.

Thiel, R. **Glaucoma.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 145.

This is a discourse on the present state of diagnosis and therapy of primary glaucoma, entering minutely into different methods of treatment. In spite of regulation of intraocular tension and observance of hygienic and dietetic rules, in some cases gradual deterioration of function cannot be arrested. Important changes in the intraocular vascular system may endanger the nutrition of the optic nerve and retina, and this vascular process will run its further course after regulation of tension. Tearing and bending of the nerve fibers at the margin of the excavated disc probably do not cease immediately after regulation of tension. C. Zimmermann.

Willie, W. A. **Sclerectomy with iridencleisis.** Brit. Jour. Ophth., 1936, v. 20, April, p. 229.

This operation is a combination of Herbert's wedge-isolation operation and iridencleisis. The operation field is exposed by forming a conjunctival flap. After the wedge operation is performed the iris is drawn into the incision and perforated with a needle threaded with woman's hair, to prevent the iris from slipping back into the anterior chamber. Both ends of the hair are brought through the conjunctival flap, but this stitch need not be tied. The conjunctival flap is drawn over the operative field on the cornea and sutured at either end. D. F. Harbridge.

Wolfe, O. R., and Blaess, M. J. **Seton operation in glaucoma.** Amer. Jour. Ophth., 1936, v. 19, May, pp. 400-406.

9. CRYSTALLINE LENS

Arruga, H. **Which is the most opportune moment to operate on cataracts.** Arch. de Oft. Hisp.-Amer., 1935, v. 35, Dec., pp. 626-634.

When one eye has still good vision for work, it is good judgment to wait until vision in the better eye fails sufficiently to interfere with the patient's occupations. On congenital and zonular cataracts, operation must be performed when the patient needs vision for his education. R. Castroviejo.

Carey, H. U., and Hunt, H. M. **The chemical nature of cataract in the diabetic.** New England Jour. Med., 1935, v. 212, March 14, p. 463.

Cataracts in diabetic patients are found to have a strikingly low phosphorus value. In all other respects they resemble senile cataracts, which have a higher cholesterol and calcium content than the normal lens.

Edna M. Reynolds.

Chajutin, S. M. **Gravidan in treatment of cataract and glaucoma.** Sovietskii Viestnik Opht., 1936, v. 8, pt. 2, p. 174.

From a tabulated report of cases treated with gravidan—a sterile preparation of the urine of pregnant women, the conclusions are that gravidan raises visual acuity, reduces tension, and extends the visual field in glaucoma, and that in incipient cataract it arrests the process. The effect is attributed to heightened tone of the vegetative nervous system, increased cellular metabolism, and oxidation.

Ray K. Daily.

Fledelius, Mogens. **Congenital dislocation of lens with constitutional anomalies.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1934-1935, pp. 32-35. In Hospitalstidende, 1935, Dec. 17.

The patients, both adult males with congenital dislocation of the lenses, were each six feet tall, had long slender extremities, and long spindle-shaped fingers and toes, a condition designated by the term arachnodactyly. The author believes that the dislocation of the lenses was connected with a general abnormal development possibly due to disturbance of the endocrine system in prenatal life. D. L. Tilderquist.

Giannantoni, C. **Clinical observations on posterior subcapsular rosette cataract.** Ann. di Ottal., 1935, v. 63, Dec., p. 930.

The author reports two cases of perforating injury of the cornea with posterior subcapsular rosette opacities. The lenticular opacities did not appear immediately, the first being seen two days after the injury and the second after four days had elapsed. Resolution of the opacities was relatively rapid in both instances, and normal function resulted. The author concludes that in consequence of the trauma the perilenticular fluid underwent a chemical change, interfering with normal nutrition of the lens. The posterior subcapsular rosette cataract of Vogt, by its clinical characteristics, its course, and its morphologic aspect, represents an entity clearly differentiable from all other forms of traumatic cataract. (Bibliography, one plate.)

Park Lewis.

Rea, R. L. **The parallel corneoscleral suture in cataract operations.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 300.

The author describes a suture which is inserted parallel to the limbus, one stitch in cornea and one in sclera, before the corneal section for cataract, and is tied after the extraction. A no. 6 Weiss needle with no. 00 black silk, all dipped in paraffin, is used. (Illustration.)

Beulah Cushman.

Rubino, A. **Behavior of lens in solutions varying in calcium-potassium content.** Boll. d'Ocul., 1936, v. 15, Feb., pp. 279-292.

The writer put lenses of rabbits in solutions containing different concentration of Ca and K. He gives the results, and concludes the article with a discussion on the permeability of the lens capsule. (Bibliography.)

M. Lombardo.

Strebel, J. **The relation of adrenalin, or of the adrenal glands, to the coloring matter of senile lenses.** Klin. M. f. Augenh., 1936, v. 96, March, p. 357.

The article calls attention to the adrenalin and chromic reactions of the lens which show a certain relation to cataracta brunescens or nigra, and the interesting chemical and photocatalytic connections between metabolism of the lens, ascorbic acid, pigmentation of the nucleus, and the adrenal system.

C. Zimmermann.

Tichonravova, T. H. **A case of congenital hereditary cataract.** Sovietskii Viestnik Opht., 1935, v. 7, pt. 6, p. 948.

Congenital cataract was transmitted through the mother. The brown-eyed members of the family had cataracts, whereas the blue-eyed had clear lenses.

Ray K. Daily.

Wiegmann, E. **A procedure in delayed closure of the wound after cataract extraction.** Klin. M. f. Aughenh., 1936, v. 96, Feb., p. 231.

In cases of delayed closure of the wound after cataract operation, the wound closed within twenty-four hours after introducing dionin powder into the well cocainized eye. Cocaine anesthesia is necessary to prevent sneezing induced by the dionin.

C. Zimmermann.

Woodruff, H. W. **Management of complications in the operation for senile cataract.** Trans. Amer. Acad. of Ophth. and Otolaryng., 1935, 40th annual meeting, pp. 167-174. (See Amer. Jour. Ophth., 1936, v. 19, Feb., p. 146.)

10. RETINA AND VITREOUS

Adrogue, E., and Malbran, J. **Lagleyze-Hippel disease and retinitis pigmentosa.** La Semana Med., 1936, v. 43, Feb. 6, pp. 414-421. (See Amer. Jour. Ophth., 1936, v. 19, March, p. 272.)

Amsler, Marc. **How do we stand today as regards locating tears in the retina?** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 61.

The author emphasizes Gonin's original procedure in localizing the retinal tear, namely ophthalmoscopic examination to determine the meridian of the hole, to estimate its distance from the ora in disc diameters, and then to find the latitude. Localizing instruments are considered, but the author concludes that no localizing apparatus is absolutely infallible, and that precise localization has lost much of its importance

since the diffuse action of irritating and obliterating agents has been used. The greatest advance in localization and treatment has been made by use of the diathermy needle with ophthalmoscopic control during the operation.

Careful examination and localization with the patient lying on the table before operation is advised, to be repeated until the surgeon can find the hole and knows the fundus by heart. Perfect transparency of the cornea during operation must be assured by irrigation with physiologic salt solution or by use of a contact glass. The first localizing diathermy puncture should be as accurately placed as possible, as it should be therapeutic as well as localizing, and as few punctures as possible made to seclude and exclude the whole region of the tear.

Beulah Cushman.

Belgeri, F., and Dusseldorp, M. **Operation for retinal detachment.** La Semana Med., 1936, v. 43, April 16, p. 1252. (See Amer. Jour. Ophth., 1936, v. 19, March, p. 272.)

Bossalino, G. **Retinochoroiditis of Edmund Jensen.** Arch. di Ottal., 1936, Jan.-Feb., v. 43, p. 1.

After a review of reported cases, the author describes four cases of retinochoroiditis juxtapapillaris (Jensen's disease) and also reports a case of central tuberculous choroiditis. He holds to the opinion that the disease is most probably tuberculous.

Herman D. Scarney.

Burnier, Penido. **Familial progressive macular degeneration.** Arquivos do Instituto Penido Burnier, 1935, v. 4, Dec., pp. 41-49.

Four cases occurred among eleven brothers and sisters whose parents were uncle and niece. The grandparents were also first cousins on the father's side and uncle and niece on the mother's side. The two boys of twenty and sixteen years presented more marked lesions than the two girls of eighteen and fourteen years. The visual disturbances had begun after the tenth year. Vision was reduced to counting fingers at two or three meters, except in the girl of fourteen years, who had vision of 0.2. The Wassermann and Kahn reactions were positive. W. H. Crisp.

Burnier, P., and Sales, M. **Cysticercus of the vitreous simulating glioma.** Arquivos do Instituto Penido Burnier, 1935, v. 4, Dec., pp. 131-134.

During an attack of whooping cough, a boy of six years developed symptoms of metastatic uveitis. Two months later he had secondary glaucoma, with an appearance suggesting tumor behind the semitransparent lens. The enucleated eye showed a cysticercus in the vitreous near the lens. The Penido Burnier Institute has had 52 cases of ocular cysticercus among 70,000 patients.

W. H. Crisp.

Coppez, Léon. **The treatment of detachment of the retina by means of pyrometric diathermy.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 71. (Illustrations.)

The author favors scleral diathermocoagulation as provoking choroidal irritation without perforating the sclera, so that the eye keeps its tone during the whole operation. When the operation is finished evacuating punctures are made in the cauterized areas, and all risk of hemorrhage is avoided. By the method of combining a coagulation electrode and electric thermometer (so-called "pyrometer") it is possible to measure the temperature of the coagulated tissue at the area at the moment the eschar appears. The time of application is thirty seconds or until the temperature reaches 175° F. The temperature of 175° was chosen after many experiments, as it gives perfect adhesion between choroid and retina without causing later damage to vitreous or sclera. Beulah Cushman.

Dintenfass, Henry. **Edema of the retina due to acute maxillary sinusitis.** Laryngoscope, 1935, v. 45, Feb., p. 138.

The eye findings in this case were edema of the lids on the left side, tenderness over the eyeball, tenderness over the attachment of the pulley of the superior oblique, sluggishness of the

orbicularis, lagging of the left eye on convergence, and edema of the retina in the macular region with metamorphopsia and blurred vision. Immediate improvement in the eye condition followed antral puncture and drainage.

Edna M. Reynolds.

Duke-Elder, W. S., Robertson, E. B., and Davson, H. **Studies on the vitreous body.** Biochemical Jour., 1935, v. 29, Jan., p. 72, and May, p. 1121.

The studies reported were undertaken with a view to determining whether the vitreous body increases in volume in glaucoma simplex. Experimental evidence is given that the vitreous body does not take up water in vitro under the influence of soaps and changed pH. The decrease in volume of the vitreous which occurs after treatment with acids is explained as being due to decreased stability of the vitreous following precipitation of the mucoprotein. It is concluded that the mucoprotein enters intimately into the vitreous structure and the possibility of an increase in volume of the vitreous is suggested on the basis of a cyclical process of peptization and clotting.

Edna M. Reynolds.

Giannoni, A., and Focosi, M. **Recurrent hemorrhages and hemorrhagic diatheses.** Boll. d'Ocul., 1936, v. 15, March, pp. 305-343.

Eight patients between 11 and 47 years affected by recurrent vitreous hemorrhage showed symptoms of venular hemorrhagic diathesis of the intermittent venular angiopsatirotic type, with recurrent epistaxis and ecchymotic-telangiectatic symptoms. In each of seven patients between 21 and 53 years, vitreous hemorrhage occurred only once, but with the characteristic symptoms of the other cases. The author concludes that recurrent hemorrhage into the vitreous is an expression of the venular diathesis, similar to epistaxis in the young. (Bibliography.)

M. Lombardo.

Grönvall, Herman. **Operative treatment of detachment of the retina with diathermy.** Det oftalmologiske Selskab i Köbenhavn's Forhandlinger, 1934-1935, pp. 41-53. In Hospitalstidende, 1935, Dec. 17.

Fourteen cases are reported, all operated upon by a combination of surface diathermy and of multiple diathermic perforation. In nine there was complete reattachment with good vision and with normal fields at the end of from three to ten months. Four of these patients were over sixty years of age. In the unsuccessful cases the retina either failed to adhere primarily or the detachment recurred after a short period. In one instance a scleral opening through which vitreous presented remained still unhealed after a month.

D. L. Tilderquist.

Hallum, A. V. **Eye changes in hypertensive toxemia of pregnancy.** Jour. Amer. Med. Assoc., 1936, v. 106, May 9, p. 1649.

In a study of 300 cases of varying degrees of hypertensive toxemia, some ocular fundus change was found in 62.1 percent (retinitis in 9.5 percent) of the preeclamptic patients, in 84 percent (retinitis in 11.6 percent) of the nephritic patients, and in 95.2 percent (retinitis in 45 percent) of the eclamptic patients. There was a striking increase in frequency of eye changes in direct proportion to the severity of the hypertension. The maternal mortality was two, or 0.07 percent. Both patients were primiparas and eclamptic. Bilateral detachment occurred in six cases, or two percent, and the retinas were completely reattached within ten days after delivery. The author concludes, among other things, that the ophthalmoscope should be rated next to the sphygmomanometer as an instrument of diagnostic importance in management of cases of hypertensive toxemia of pregnancy. Of this series of 300 cases, 76.3 percent showed fundus abnormalities, arterial in 62.5 percent, and retinitic in 13.2 percent. (2 tables.)

George H. Stine.

Hase, Albrecht. **On entoptic vision after retinal detachment.** Klin. M. f. Augenh., 1936, v. 96, March, p. 306.

This is self-observation by the author during his right-sided retinal detachment and after its operation by Weve's method of diathermy. All entoptic phenomena which he describes were exclusively caused by pathologic conditions within the eye. They were only noticeable during closure and at once disappeared on admitting light from the outside, but reappeared on closure of the lids. Before operation there were no entoptic phenomena except flashes of light. The phenomena set in suddenly after operation, and were most intense during the first ten or twelve days. The variability of the images seen increased with their velocity. Finally their speed became so great that only color clouds appeared, passing over into black, whereupon the normal condition during closure of the eye was restored. The rapid onset of the phenomena contrasted with their slow subsidence.

C. Zimmermann.

Kiewe, P. **Congenital malformations of the human eye.** Graefe's Arch., 1936, v. 135, p. 220.

A diagnosis of glioma retinae in an infant three months old led to the enucleation and microscopic examination of an eye with rare developmental changes. A closed arteriovenous circulatory system was found within a connective-tissue-glial cord, connecting the region of the papilla with a connective tissue layer on the lens. Into the posterior end of this otherwise solid cord entered the fibers of the optic nerve, far anterior to the surface of the retina.

A rare congenital malformation was discovered in the eye of a child of three years, enucleated because of a metastatic purulent process which led to vitreous abscess and pseudoglioma. There was persistence of Cloquet's canal and of the capsulo-lenticular membrane, together with heterotopia of the retina and formation of retinal folds.

H. D. Lamb.

Klein, Miklos. **Researches into the physics of diathermic coagulation on the eye; some practical hints as to the performance of operations.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 84.

The heat developed in a body is proportional to the resistance and to the square of the current. Four periods may be distinguished during coagulation. The electrical resistance falls quickly. Lowered resistance remains constant and at this time coagulation occurs and lasts until the coagulated spot begins to get dry. When the spot is dry the electrical resistance rises and invisible sparking may be registered. This is most undesirable. Sparking grows more intense and the coagulated spot becomes carbonized.

Dosage of the diathermic method is of supreme importance and should be controlled by the size of the electrodes and stability of the high-frequency generator. The author found approximately 30 milliamperes for the pins and 50 to 70 milliamperes for surface coagulation best with the instrument he was using.

Beulah Cushman.

Lijo Pavia, J. **Apropos of "Ophthalmoscopy of arterial hypertension."** Rev. Oto-Neuro-Oft., 1936, v. 11, Jan., p. 12.

The author points out that his prior contributions to the subject have been ignored in a paper by Espildora Luque (see Amer. Jour. Ophth., 1935, v. 18, Aug., p. 797).

M. Davidson.

Lobeck, Erich. **The retinal changes in chronic lead poisoning.** Graefe's Arch., 1936, v. 135, p. 165.

After employment for 37 years as a lead burner, a man 51 years old complained of a disturbance of vision of ten days duration in the left eye. He showed a blue line on the gums, and in the blood many basophile-stippled erythrocytes, poikilocytosis, and metachromasia. With vision of 5/35, the left fundus presented extensive changes up and temporal and in the macular region. At the former location were numerous white foci in the retina, usually dots but also showing fusion into large flecks. Between them were many tiny hemorrhages. The retinal blood vessels were partly covered by the foci. The macula showed edematous swelling and

later a circumscribed white focus. (One color illustration.)

H. D. Lamb.

Meighan, S. S. **Retinitis pigmentosa treated by cervical sympathectomy.** Trans. Ophth. Soc. United Kingdom, 1935, v. 55, p. 93.

A patient had cervical sympathectomy for retinitis pigmentosa in 1930. The improvement in vision and visual fields reported in 1931 (see Amer. Jour. Ophth., 1933, v. 16, p. 938) persisted for nineteen months. Then the vision gradually failed, the fields contracted, and after five years the patient was employed in the blind asylum. Since that time a patient 33 years old and another 49 years old have been operated on. Improvement in vision was reported in the younger patient immediately after the operation, but no improvement in vision or fields was reported by the older patient. Beulah Cushman.

Petragnani, Vittorio. **Contribution to the pathogenesis of recurrent hemorrhage into the vitreous.** Boll. d'Ocul., 1936, v. 15, March, pp. 363-379.

Three men, 24, 25, and 36 years old, showed typical recurrent hemorrhage into the retina. Two had unquestionable clinical and laboratory signs of tuberculosis, but these signs were entirely lacking in the third patient, who was only affected by a slight ventricular insufficiency. In all three cases the ophthalmoscope showed the signs of phlebitis and periphlebitis of the retinal vessels. Tuberculosis is an important but not a constant factor in the genesis of this affection. (Bibliography.)

M. Lombardo.

Prevec, S. **A case of angiomatosis retinae.** Klin. M. f. Augenh., 1936, v. 96, Feb., p. 200.

A woman aged 45 years, whose right eye had become blind in 1926, showed in the left upper temporal quadrant near the equator a yellowish red angiomatous nodule of about four disc diameters, projecting about 5 D. into the vitreous. It was entered by the enormously dilated superior temporal vein, with two branches of the superior temporal artery. Very small hemorrhages covered the nodule. The surrounding retina showed flat detachment. At the macula was a hole of one third disc diameter, which was the cause of sudden disturbance of vision with central scotoma. As angiomatosis retinae is often associated with similar, mostly cystic, formations in other organs, especially in the central nervous system, the nervous symptoms of this patient may with great probability justify a diagnosis of angiomatosis of the retina and spinal cord. (Illustrations.) C. Zimmermann.

Schupfer, Francesco. **Retinitis pigmentosa, with special regard to pathogenesis.** Boll. d'Ocul., 1936, v. 15, Feb., pp. 189-262.

The writer reports eight cases of retinitis pigmentosa in patients from 22 to 51 years, one case of retinitis punctata albescens, and one of pigmentary degeneration of hemorrhagic origin. The general examinations showed some changes in the olfactory sense with blood dyscrasias and disturbances of gastric chemistry. From the symptomatology the writer excludes a pure diencephalic pathogenesis, and he concludes that degenerative lesions of different embryonic layers exist in these cases, with the mesodermal layer primarily affected. (Bibliography, 29 figures.) M. Lombardo.

Stine, G. H. **Recent advances in the treatment of spontaneous retinal detachment.** Colorado Med., 1935, v. 32, Sept., p. 708.

Stine takes up the etiology, mechanism, diagnosis, and treatment of retinal detachment in an excellent manner. The various operative methods are well explained and described.

Theodore M. Shapira.

NEWS ITEMS

Edited by Dr. H. Rommel Hildreth

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News items should reach the Editor by the twelfth of the month

Deaths

Dr. Henry Hawkins Tyson, New York, died April 18, 1936, aged 70 years.

Dr. James Mariweather Hull, Augusta, Ga., died April 13, 1936, aged 77 years.

Dr. H. Hershey Farnsler, Harrisburg, Pa., aged 57 years, died March 14, 1936, of acute nephritis.

Dr. Francis I. Proctor, Santa Fe, N.M., died July 8, 1936, aged 72 years.

Miscellaneous

Because of outside duties Dr. H. Lyons Hunt will relinquish the Director-Generalship of the American Medical Editors' and Authors' Association. Dr. Harold Hays, of New York City, who has contributed a great deal to medical literature and has been associate editor on a number of medical journals, will assume the office of Director-General on August 1.

Societies

The International Association for the Prevention of Blindness met in conjunction with La Société Française d'Ophtalmologie in Paris on May 11, 1936. The annual address was read by the president, Prof. de Lapersonne.

Mr. Leslie Paton of London, who is the honorary chairman of the International Ophthalmological Congress to be held in Cairo in 1937, was made a member of the Executive Committee. The president urged the view expressed by Dr. Park Lewis that the aim of the association was not so much to discover new ways of sight preservation, since that was the sphere already occupied by medical and scientific colleagues, but rather to ultize the vast amount of experience already accumulated and give it practical application.

Prof. Terrien read a paper on "The classification of forms of conjunctivitis." Dr. Rowland P. Wilson came from Cairo and presented a paper on "Conjunctivitis of children in the Orient," pointing out the seasonable character and influence on the development of trachoma. Dr. MacCallan urged the importance of early diagnosis in trachoma and of distinction between other forms of conjunctivitis. Among those discussing these papers were Prof. Bartels of Dortmund, Marín Amat of Spain, Lacat of Paris, Toulant of Algiers, Moutinho of Lisbon, and Nataf of Tunis.

The meeting of the International Organization of the Campaign against Trachoma was held in Paris on May 11, 1936, during the session of the Annual Congress of La Société Française d'Ophtalmologie.

After an introductory address by the President, Dr. A. F. MacCallan, papers were read on the treatment of trachoma in children by Dr. MacCallan, Dr. Wibaut (Holland), and Dr. Zachert (Poland). The subject was discussed by Dr. Ragazzi and Professor Baslini (Italy), Dr. Joseph Jitta (League of Nations), Dr. Aubaret (France), Dr. Nataf (Tunis), and Dr. Marín Amat (Spain). These addresses will be published in a forthcoming number of La Revue Internationale du Trachome, which has been made the organ of this association.

The Eye Section of the Philadelphia County Medical Society elected the following officers: Chairman, Dr. Sidney L. Olsho; Vice-Chairman, Dr. Walter I. Lillie; Secretary, Dr. Edmund B. Spaeth; Editor of Publications, Dr. Louis Lehrfeld.

The Chicago Ophthalmological Society announces the establishment of the William Hamlin Wilder Foundation, a memorial to the late Dr. W. H. Wilder. The purpose is to establish and maintain a lectureship in ophthalmology or an allied topic, the lecture to be presented in Chicago every two years. To that end, a fund of ten thousand dollars is being raised, the interest of which is to be used solely for the payment of an honorarium to the lecturer and for the expenses of publication of the lecture. The administrative details are vested in a Committee composed of the President and the three most recent past Presidents of the Chicago Ophthalmological Society. The financial details are to be managed by the Northern Trust Bank of Chicago. Friends and colleagues of the late Dr. Wilder who wish to aid in this perpetuation of his memory, are invited to send their contributions to the Wilder Foundation, Northern Trust Bank of Chicago.